February 5, 1945

STEEL

The Magazine of Metalworking and Metalproducing

ESTABLISHED 1882

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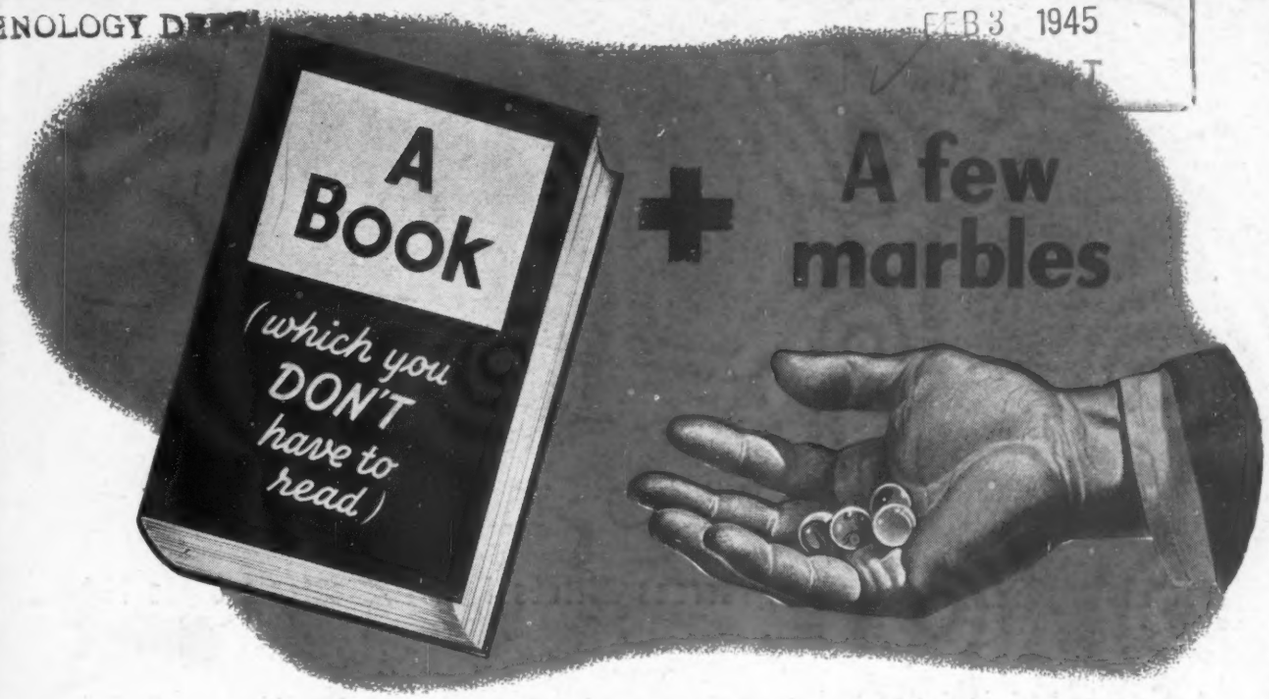
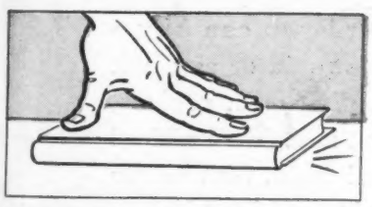
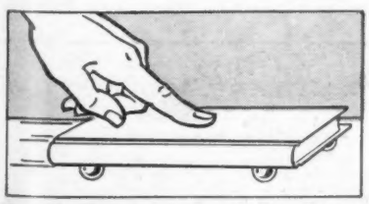


tells the WHY of Ball Bearings



TRY THIS: Place a book on your desk and your hand firmly on it. Then try to push the book across the desk. That's the principle of *sliding motion*—hard on book, desk and energy.



THEN THIS: Place 4 marbles under the book, your hand on top—and push. The marbles roll freely, the book moves easily in any direction. That's *rolling motion*—smooth and easy on everything!

There is a simple, fundamental truth in the principle of the ball bearing: "Nothing Rolls Like a Ball!"

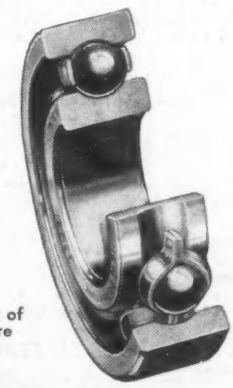
The ball possesses inherent advantages unequalled by any other rolling body. There are no *ends* to a ball—so its axis of rotation need never be artificially fixed.

Thus, a *Ball* bearing bears the loads on a circle of *free rolling* steel balls, reducing friction and wear, maintaining precise location of parts and cutting maintenance time—as does no other type bearing.

That is why over 300 million New Departure Ball Bearings are at work in this war. *That* is why designers of peace-time machinery are designing more ball bearings into their machinery than ever before.

There is really no substitute for the ball bearing—nor any substitute for the technical experience and creative engineering that go into New Departure Ball Bearings.

Ask for your free copy of "Why Anti-friction Bearings?"



Cut-away view of New Departure Ball Bearing

nothing rolls like a ball

NEW DEPARTURE

BALL BEARINGS

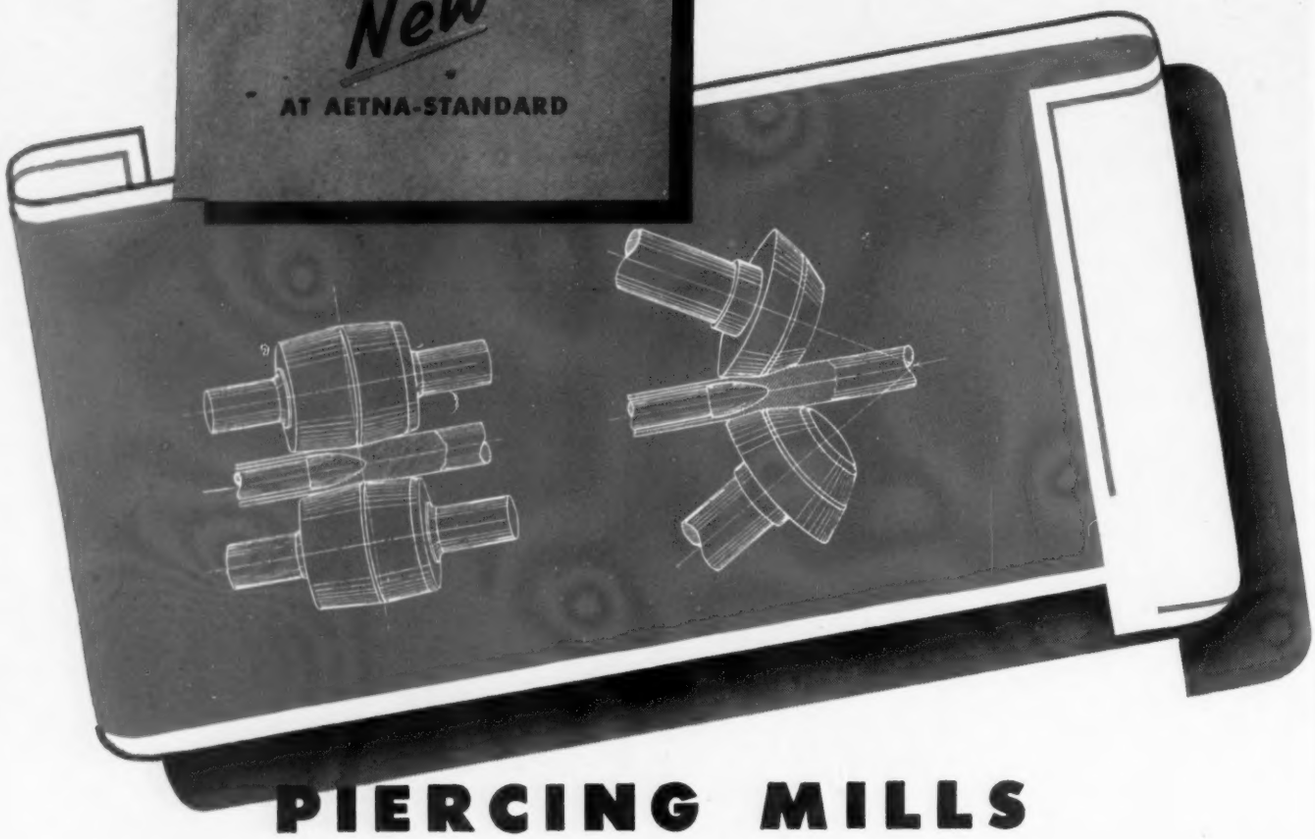
3351

NEW DEPARTURE • DIVISION OF GENERAL MOTORS • BRISTOL, CONNECTICUT • Sales Branches: DETROIT • CHICAGO • LOS ANGELES

THERE'S ALWAYS SOMETHING

New

AT AETNA-STANDARD



PIERCING MILLS

For Piercing Ferrous or Non-Ferrous Billets into Tubes from 3″ to 18″

Aetna-Standard, in the past 40 years, has built more piercing mills than all other companies combined. In fact, 90% or more of all piercing mills have been Aetna-made. As a result, we have had more experience with this type of equipment than any other concern.

And the margin of difference between a sound piercing mill installation and a poor one is experience . . . For instance, the application of the proper speed and power to the different materials and products is most important.

From Aetna-Standard you can buy a complete seamless tube mill or any unit such as the piercer, plug mill, reelers, sizing mill, or reducing mill. We build all sizes of mills, large and small, with power units ranging between 500 and 5,000 Horsepower, and roll diameters from 19″ to 54″.

The AETNA-STANDARD ENGINEERING COMPANY

YOUNGSTOWN · OHIO · U.S.A.

ARMY E NAVY

FACTS ABOUT AETNA-STANDARD

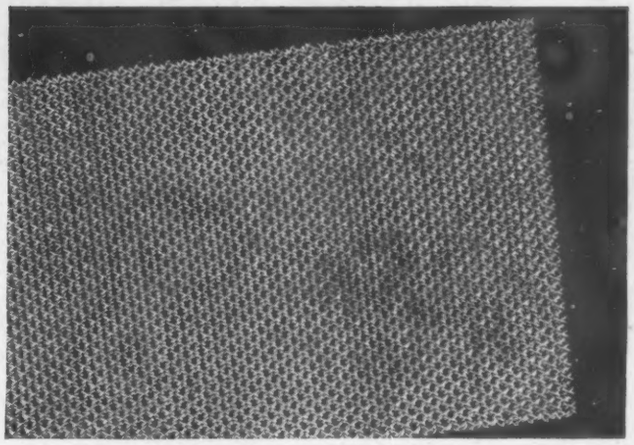
Aetna-Standard can furnish either the barrel or cone type of piercing mill. Depending upon the product, we will lay out your tube mill for either single or double piercing.

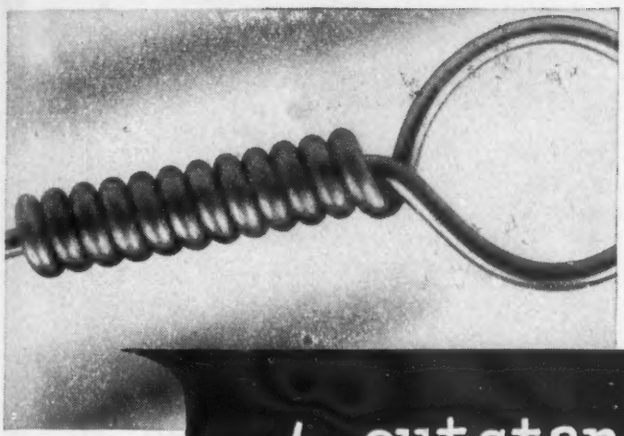
DESIGNERS AND BUILDERS TO THE STEEL, NON-FERROUS AND CHEMICAL INDUSTRIES

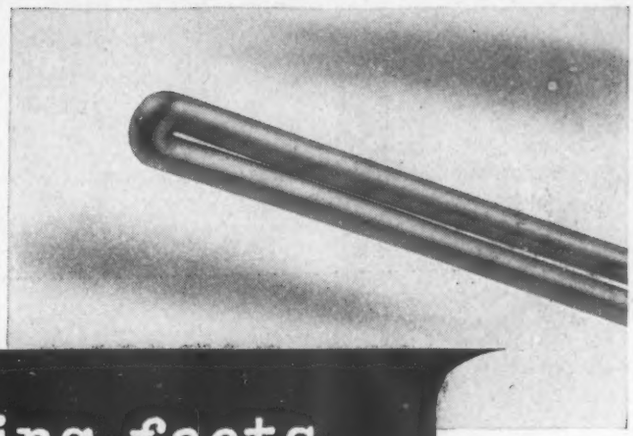
ASSOCIATED COMPANIES:

HEAD, WRIGHTSON & COMPANY, LIMITED, THORNABY-ON-TEES, ENGLAND

JOHN INGLIS COMPANY, LIMITED, TORONTO, ONTARIO, CANADA







4 outstanding facts about bethanized wire

Without any harm whatsoever to the zinc-coating, bethanized wire can be:

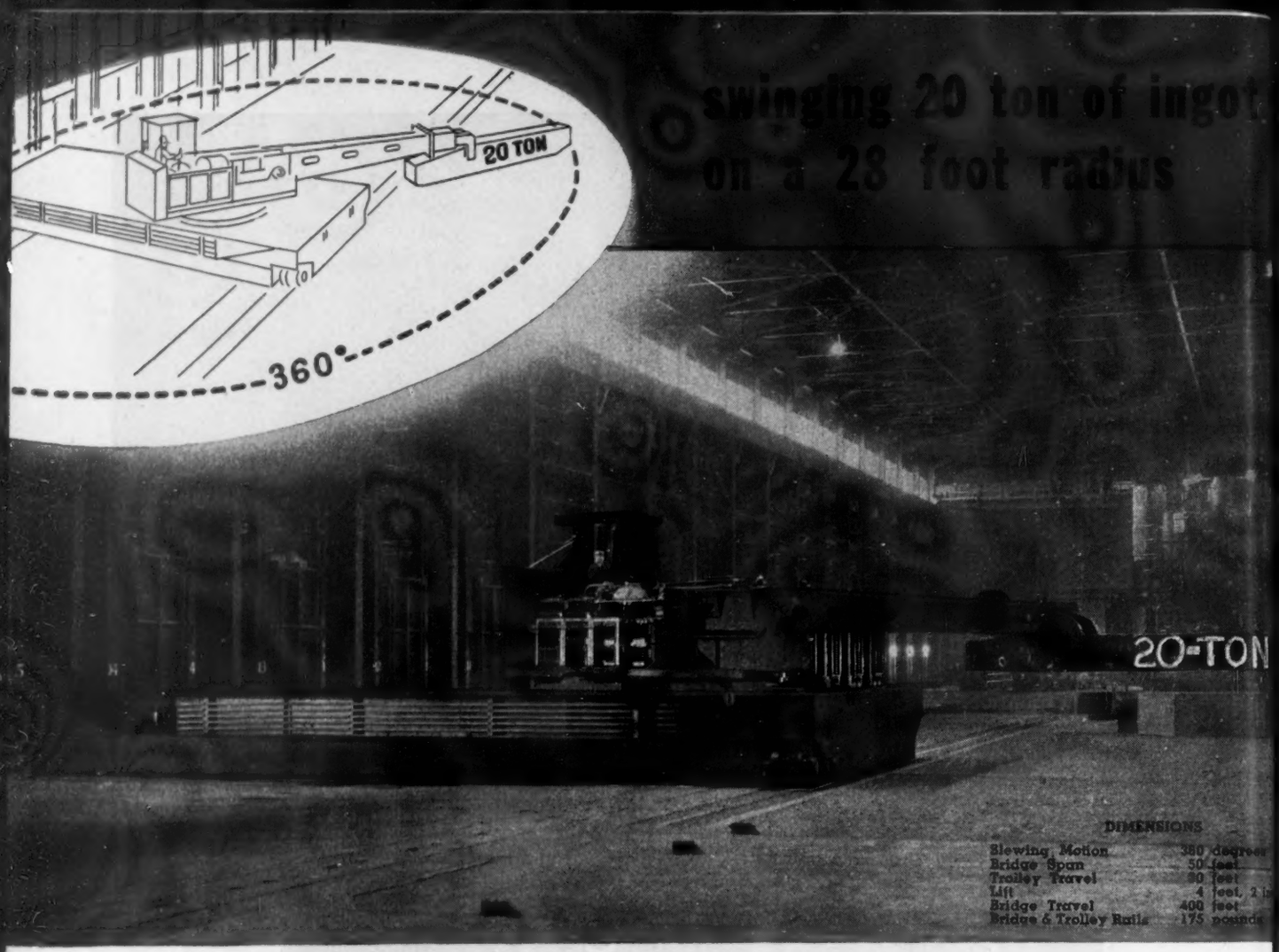
1. *drawn to a fraction of its original size*
2. *wrapped around its own diameter*
3. *bent back flat upon itself*
4. *formed into intricate shapes*

Bethanized wire is able to pass muster after these drastic tests because of the remarkable ductility of the bethanized coating. The bethanized coating is 99.9+ per cent pure zinc, and is applied by an advanced electrolytic process which applies the zinc uniformly both along and around the wire. There are no thin spots in the coating where rust might start.

Because of the purity and uniformity of the coating, bethanized wire is highly resistant to corrosion. For maximum protection where atmospheric conditions are unusually corrosive, coatings can be used two and three times as heavy as those specified for conventional Type 3 galvanizing.

Enormous quantities of this versatile zinc-coated wire are today providing strength-building sinews for assault wire, armoring submarine cables and performing hundreds of other war-related tasks. Many of the applications of bethanized wire had previously been thought impossible for any zinc-coated wire.

BETHLEHEM STEEL COMPANY, Bethlehem, Pa. BETHLEHEM STEEL Bethlehem Steel Export Corporation, New York City



New Alliance Floor Type Ingot Charging Machine - - - one of the world's largest

● This Ingot Charging Machine shows that The Alliance Machine Company is still living up to its slogan—"The World's Largest Builders of the World's Largest Cranes." We have built into this machine features that have been developed and tested in the course of our 42 years of engineering and shop experience, and it is little wonder that when steel mill engineers are confronted with unusual problems, involving the handling of the smallest ingot to the 300 ton ladle of molten steel, that Alliance is consulted.

This machine is designed to grip, lift and swing a 20 ton ingot at a radius of 28 feet. The rigid cast steel upper revolving frame turns on conical rollers supported on a one piece cast steel lower frame so designed that the conical rollers operate in a bath of oil.

Great stability had to be provided in this Charger to successfully handle the heavy cantilever loads. This accounts for the ponderous sizes and 400,000 pounds of weight. Both the trolley and bridge are equipped with 8 rolled steel track wheels housed in cast steel compensating trucks. This construction provides smooth operation and reduces the wheel loading to a minimum.

An oil hydraulic system supplies the power for the hoisting and gripping cylinders. Contact rails located in a trench, under the bridge, supplies the necessary operating electric current.

ARMY E NAVY

[redacted]

Alliance

THE ALLIANCE MACHINE CO., ALLIANCE, OHIO - Pittsburgh Office: 1622 Oliver Building

AFTER exhaustive tests Macklin has developed a new bond for silicon carbide vitrified grinding wheels for use in roughing Tungsten Carbide tipped tools. Many large plants have already found that these wheels marked, GC-60-I-8-V-5 give outstanding results. They are cooler cutting, require less dressing and, therefore give unusually long life. Also available in other grains and grades.

Ask for the services of an experienced Macklin Field Engineer who will, without obligation, assist you with your grinding problems. There is a Macklin wheel for every grinding job. Why not *"Protect your Production."*

MACKLIN COMPANY

Manufacturers of GRINDING WHEELS — JACKSON, MICHIGAN, U. S. A.

Distributors in all principal cities

Sales Offices: — Chicago - New York - Detroit - Pittsburgh - Cleveland - Cincinnati - Milwaukee - Philadelphia

BEHIND THE SCENES

Tom Thumb Radio

■ The trend to smaller and smaller things continues, and with some things we thought were real interesting. One of the latest spiels on postwar civilian materiel puts forth the fact that if you're interested in carrying your favorite soap opera with you, you will be able to get a personal radio of about the same dimensions as a matchbox. This has the disadvantage that it has to be plugged in, but along in the same week's harvest of chaff came another story which ironed out this difficulty, with the announcement that the military is now using industry's latest creation, a battery which is small enough to hang on a gal's charm bracelet. The new cell is about ⅝ of an inch long, and is supposed to put out about the same amount of power as a regular dry cell. It uses mercury as its principal ingredient, and has already switched the mercury market from the doldrums to an interesting state of activity. As you may have guessed by now, there is really an ulterior motive in bringing up this amazing fact. The reason is that STEEL each week brings you the latest quotations in the mercury market. Just one of the hundreds of little services we perform which are mighty small to the average reader but exceedingly important to that person who gets his bread and butter from them.

Butter No Better

■ Speaking of butter, as we were in the last line above, and smaller and smaller things, as we were in the first line above, the two seem to go well together, don't they? We just heard that you can make a lot of money in the restaurant business these days, a fact we had long suspected.

Postwar Optimism

■ Doing as we are supposed to do in this column and peering slightly behind the scenes in steel, together with other folks in the industry, we learned from last week's issue that the pessimists who say the productive capacity of the industry is overexpanded must be wrong. In fact, Irving S. Olds, board chairman of U. S. Steel, indicated there would be a whale of a lot of equipment required to gear just one plant to the postwar demands of the steel consuming industries. The list of improvements slated for after-the-war at Gary, Ind., is enough to bring prosperity to a lot of suppliers for a year, and there is hardly a plant in the industry which doesn't need much the same sort of face lifting just to keep in the swim. As recently as 1941 it was stated by reasonably well informed people in the steel business that the sheet mills were able to produce more sheets than could ever be used, and in fact it seemed doubtful if there would ever be enough demand to keep all our capacity busy. Now there is talk that the postwar sheet demand will require the building of additional facilities.

Prodigal Son

■ The renewal of steel demand from a lot of war programs which had been dead or dying has brought with it a lot of problems. The same thing has happened in aluminum, where some sales forces got back on the road just long enough to book a batch of orders and are now back over the same road trying to get them cancelled out again. It seems that our generals were not the only ones fooled by the sudden turn of events. Just to keep an oar in on some of the other metals, a steel mill has again started to roll brass, a zinc company is anxiously looking for some workers it laid off recently, and in one shipyard a worker showed up after having been off the job for some three months, and stated he was merely an absentee, he really didn't mean to quit at all.

Wolframite to Mothballs

■ Speaking of that mercury quotation reminds us that in our weekly issues we carry as regular copy some very strange citizens. For example, we think probably very few of our loyal army of followers ever express great interest in such things as indium or palladium, sodium cyanide on wolframite. Yet they are quite important in their own fields, as are such things as Muntz metal and staybolt iron or plow bolts. And did you ever know we quote the price on mothballs every week? Well, we do. You can get them either in balls or in flakes at eastern plants, if you are a mothball jobber, at 8 cents per pound. Or, if you'd rather, we can tell you that the price on industrial xylol is 27 cents per gallon, with freight allowed east of Omaha. That looks like discrimination on the people west of Omaha, and we had better look out or we will be the target for spears from the Western readership.

Come One, Come All

■ One of the places where they're building that extra-small battery we mentioned above is in Madison, Wis. The RMR Corp. subsidiary of Ray-O-Vac Co., has a contract to make this product. In fact, they've had a contract for a long time, and they had it for some time before there was anybody around to make the batteries. Faced with a complete manpower drought, they appealed to the citizenry of Madison to help out, and now it has become the popular thing to do in that beautiful little lake city to put in idle hours at RMR. There are a lot of amusing tales told of the job there. One man, who claims 81 years, came in supported jointly by his wife and a cane, and was put to work. After a week, he threw away his cane, and according to a report in the "State Journal" of that city, can dispense with his wife on his lunch hours. One executive says he is so out of condition he can hardly tie his shoelaces without losing his breath, but they gave him a job tossing around 75 pound boxes. One night he came upon his huskiest employe, also working there, whose job was to measure liquid with an eye-dropper. It is said that you can go into the plant, tell the receptionist you want a job, and be working inside half an hour. After you've worked as long as you like, you go to the pay window and draw your earnings. Honest, we're only telling you what we read in the public prints. Maybe it's worth investigating, no?

Vol. 116, No. 6, February 5, 1945, issue of STEEL, published every Monday at Cleveland, Ohio. Entered as second class matter at the post office, Cleveland, O., under act of March 3, 1879. U. S. and possessions, Canada, Mexico, Cuba, Central and South America, 1 year $6; 2 years $10; all other countires, 1 year $12. Current issues, 25c. Yearbok of Industry issue, $2.00.

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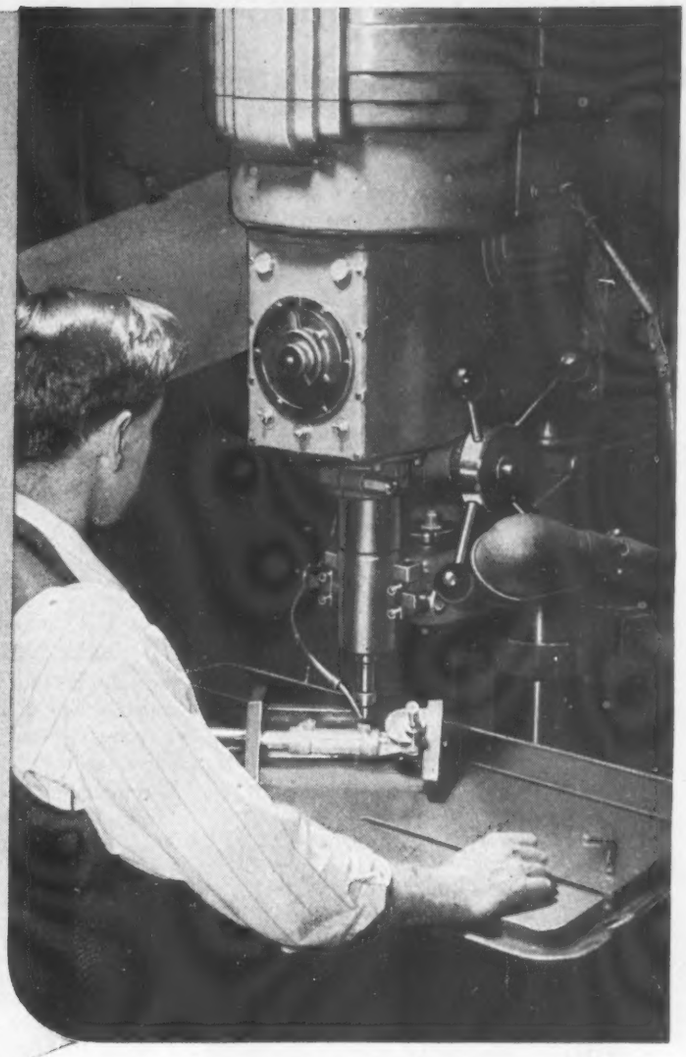


Precision Tapping

. . the Finishing Touch to a Perfect Part

THE Denison Engineering Company, Columbus, Ohio, makes a wide variety of aircraft parts. Cutting internal threads to Class 3 fit is usually the last of many precision machining operations on these beautifully-finished aluminum parts. A thread error at this stage means the loss of all previous time-taking operations through the scrapping of a costly piece.

Replacing old-type tapping machines with a new Warner & Swasey Precision Tapping and Threading Machine has resulted in an average time saving of 35%. On the particular operation, illustrated above, tapping a ⅛″-27 pipe thread in a Landing Gear Nose Body, Class 3 fit, with depth held to .010 accuracy, a Warner & Swasey No. 12 has increased production 100% over former method.

Very likely Warner & Swasey Precision Tapping and Threading Machines can show similar results for you. Your Warner & Swasey field man can explain how the patented principle of lead screw and solenoid actuated guide fingers can eliminate thread inaccuracies.

WARNER & SWASEY

Precision

Tapping and Threading Machines

4 Models—Capacities 0-80 to 1½″ in steel,—to 2½″ in soft metals and plastics

YOU CAN MACHINE IT BETTER, FASTER, FOR LESS . . .
WITH A WARNER & SWASEY

WARNER & SWASEY · W&S · CLEVELAND, OHIO

TURRET LATHES, SADDLE AND RAM TYPES — CHUCKING AND BAR TOOLS — TAPPING AND THREADING MACHINES

Today GATES Synthetic Rubber V-Belts

—are giving *BETTER SERVICE* than any V-Belts Ever Made of *NATURAL RUBBER!*

-and there is a GATES V-Belt precisely engineered to fit any special need

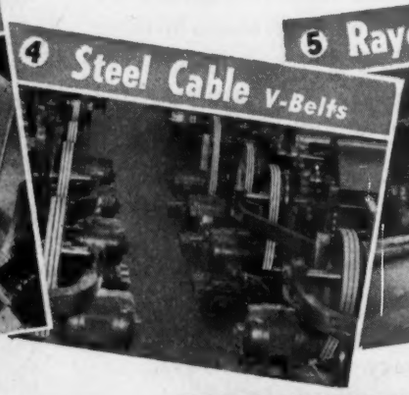
No V-Belts built by *anyone* before the war could stand the service now daily delivered by Gates V-Belts on army tanks, tractors and self-propelled big guns. Gates has developed these greatly superior VBelts through intensified, specialized research—and Gates is building these belts entirely of *synthetic rubber!*

The important point, for industrial V-Belt users, is this:—Every improvement developed by Gates for these Army V-Belts has also been added, day by day, to the quality of the standard Gates Vulco Ropes which have been delivered to you.

As you know, war-time improvements in many *other* products must be withheld from general use until after the war is won—but victory depends so directly upon *production*, and production so directly upon V-Belts which drive the producing machines, that Gates has been able to give you *immediately*, in your Standard Gates Vulco Ropes, every V-Belt improvement which Gates specialized research has developed for use in the Army's motorized equipment.

In addition, where V-Belts of special construction are required, your Gates Rubber Engineer is in position to supply a Gates V-Belt that is precisely engineered to meet your special needs.

Whatever drive problem or V-Belt problem you may have, you need only pick up your phone book and look under the heading "Gates Rubber." The Gates Rubber Engineer will bring right into your plant the full benefits of every advance in V-Belt construction and in drive operation that Gates specialized research has developed.



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Engineering Offices and Stocks in All Large Industrial Centers

Gates

THE MARK OF SPECIALIZED RESEARCH

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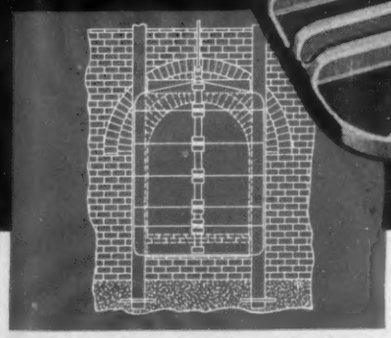
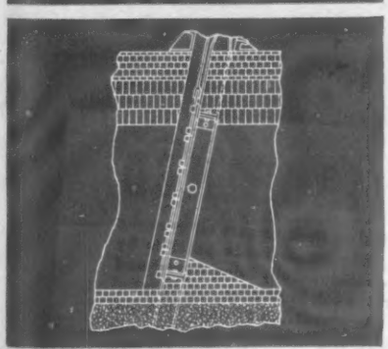
Reduce installation and maintenance costs
with HEAT SAVER VALVES made of

FAHRITE

HEAT AND CORROSION *Alloys*





Here's Why They Are Better:

- No water cooling—saving water, piping and pumping costs.
- No accumulation or coking at seat due to cooling.
- No failure due to muddy or acid water.
- Lower B.T.U. loss.
- Lower installation and maintenance costs.
- Simplified, less costly mechanisms.
- Lighter and easier to operate.
- Do not grow, warp or crack.
- Do not oxidize or corrode.

The Ohio Steel Foundry Co.

LIMA & SPRINGFIELD, OHIO

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Free enterprise is the only way to constantly higher American living standards.

NEW BRITAIN MACHINED

At this very moment Allied artillery shells are reaching their targets all over the world with deadly accuracy . . . an unequaled performance made possible by American men, women and machines producing precision-built firing power and ammunition. • New Britain Automatics remain on the job in turning out essential parts for projectiles and other war materials and equipment . . . machines designed to withstand present day production demands and engineered to stay accurate . . . now and postwar. • New Britains produce more . . . better and faster . . . for less.

NEW BRITAIN AUTOMATICS

THE NEW BRITAIN MACHINE COMPANY • NEW BRITAIN, CONNECTICUT

NEW BRITAIN-GRIDLEY MACHINE DIVISION

It's easy to pick the wrong electrode...

HE'S A WELDER AND SELECTS ELECTRODES ACCORDING TO THEIR CLASSIFICATION NUMBER
..BUT HE'S CONFUSED BY THE VARIOUS TRADE NAMES AND NUMBERING CODES
THIS IS SILVER FOX #5
98 B ?
AND THIS IS FLASH KING
HOW ABOUT TYPE 922 ?

That's why Allis-Chalmers uses AWS numbers...

EVERY user of arc welding electrodes has been confronted with this same puzzling situation. Each electrode manufacturer seems to have his own trade name — his own numbering code.

To eliminate this confusion Allis-Chalmers adopted standard American Welding Society classification numbers for the new line of welding electrodes. With the aid of this *official* numbering code correct selection is simple and foolproof.

Shop-tested and production proven in Allis-Chalmers own huge plants, these rods are available *now* at your nearby Ampac dealer or A-C district office. Bulletin B6340 has complete information.

ALLIS-CHALMERS

MILWAUKEE 1, WISCONSIN

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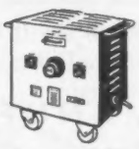
HEADQUARTERS FOR WELDING EQUIPMENT

AMPAC A-C WELDERS



WELD-O-TRON D-C WELDERS

ALLIS-CHALMERS ELECTRODES

ARC WELDING ACCESSORIES

♪ *Tune in the Boston Symphony, Blue Network, every Saturday at 8:30 pm, EWT.*

D.O.James

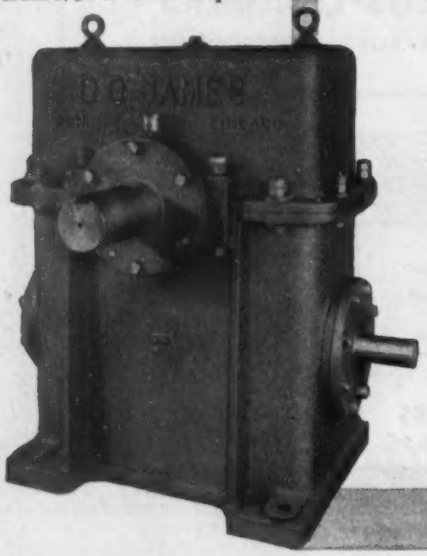
ESTABLISHED 1888

WORM GEAR REDUCERS

Designed and Built for the Successful "Doing of The Job"—

Type "H" Worm Gear Speed Reducer

Horizontal (Illustrated) or Vertical Drive—26 Sizes, Ratio Range of 6 to 65:1, and from 1/32 to 150 Horsepower.



Due to their wide ratio range, the D. O. James Worm Gear Reducers are ideal for many power saving installations. They are designed and built by an organization that has had over a half century of Gear Making Experience and who have successfully pioneered the Gear Reducer to its present high efficiency standards. The many and repeated installations of D. O. James Worm Gear Speed Reducers testify to their superiority and adaptability. These reducers are the result of excelling craftsmanship in our engineering, cutting, grinding, assembling, inspection and testing departments. Their efficiency is further increased in the usage of the best and most suitable materials. An experienced supervision and modern plant facilities assure a finished product that will be successful in "The Doing of The Job."

D. O. JAMES MANUFACTURING CO.

1140 W. Monroe Street • Chicago, Illinois

Makers of Every Type of Gear and Gear Reducer

STOUT STEEL MUSCLES
for the Merchant Marine

The rigging for a typical cargo ship requires over 11,000 feet of wire rope, ranging in size from ¼ inch to 2¼ inches, and weighing over 10 tons. Scores of shipyards are building such ships—and using plenty of tough, dependable Wickwire Rope.

Oil fields, mines, logging camps, construction crews—and our fighting men abroad—also depend upon the stout steel muscles of Wickwire Wire Rope to do their heavy hoisting and hauling jobs. That's why—even with more equipment and working at full capacity 24 hours a day—we cannot keep up with the great demands for Wickwire Rope.

Since wire rope is harder to get, each length must be made to last longer. WISSCOLAY *Pre*formed Wire Rope, manufactured by Wickwire Spencer, not only lasts longer, but it's kink-resistant—easier to cut, splice and install—safer to handle.

If you have a wire rope problem our wire rope engineers will be happy to be of service. Call or write our nearest branch office or Wickwire Spencer Steel Company, 500 Fifth Avenue, New York 18, N. Y.

VALUABLE GUIDE FOR ALL ROPE USERS

Thousands of copies of "Know Your Ropes" have been sent to men in industry and the Services. Packed with ideas for making wire rope last longer this 82 page book contains 48 wire rope life-savers; 78 "right and wrong" illustrations, and 20 diagrams, tables, graphs, charts.

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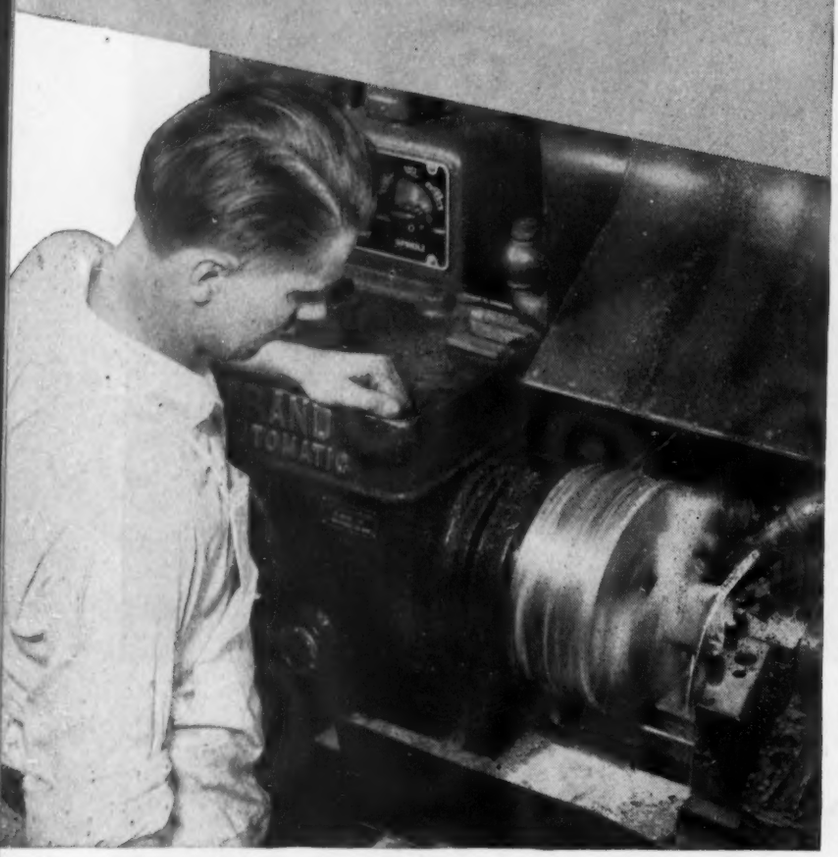
FIELD REPORTS ON SHORT AND LONG RUN TURNING JOBS . . .



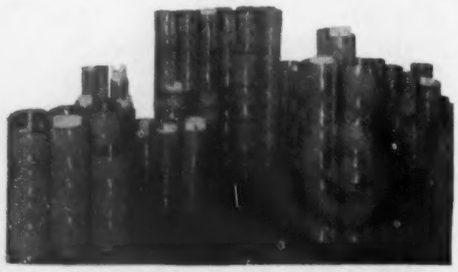
How Sundstrand AUTOMATIC LATHES INCREASE PRODUCTION ON *BOTH*

Whether you have a mass production, short-run or a combination of both types of turning jobs, the Sundstrand Automatic Lathe can possibly turn them faster. The simplicity of cycle changeover and set-up, for instance, permits setting up some jobs in less than 30 minutes . . . making it profitable to tool up for short-run turning. Naturally, these savings are also available and desirable for turning long runs.

Here are a few authentic field reports covering profitable operations in other plants. There are many more. The 44 page booklet offered on the opposite page illustrates and describes additional jobs. Use it as a guide in checking operations on your own turning jobs. Write for it today.

Turning 1000 Different Bushings

● Parts — Bronze bushings • Lot Sizes — 4 to 200 • No. of Machines formerly — 2 • No. of Sundstrand Lathes — *One* • Longest Changeover Time — 30 minutes • Production Increase — *Doubled*

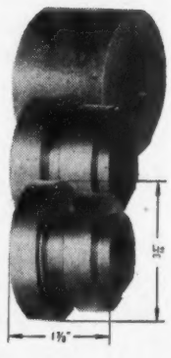


Turning 75 mm. Shot

● Part — Armor-piercing Shot
Tooling — Special
Lot Size — Continuous Production
Operation—Turn and form nose from rough blank
Features — Lathe provided with heavy spindle to take extra heavy forming cuts.

Turning Gear Blanks

● Parts — Gear Blanks, Sprockets, pulleys, sleeves, etc.
No. of Machines—2
No. of Operators—1
Lot Size — 24 to 100 pieces
Lot Size this job—30
Former Time—45 min.
Present Time—10 min.
Savings—35 min. per piece



Free GUIDE TO FASTER TURNING

● This 44 page booklet, crammed full of technical data and other valuable information can be a valuable guide in checking the effectiveness of your present turning operations. Processing gear blanks, tips on processing other work, how to select the proper lathe and many other valuable features are described and illustrated. Write for your copy today. Ask for Bulletin 733

ARMY (E) NAVY

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SUNDSTRAND MACHINE TOOL COMPANY

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RIGIDMILS • FLUID-SCREW RIGIDMILS • AUTOMATIC LATHES • HYDRAULIC EQUIPMENT • DRILLING AND CENTERING MACHINES • SPECIAL MILLING AND TURNING MACHINES

GREAT STRENGTH—HIGH DUCTILITY

These Two Important Properties Are Joined in One Great Steel

There are many steels that offer high yield strength; there are others that provide good ductility. It is the combination of both desirable properties in N-A-X High-Tensile Steel that makes possible exceptional economies in the design and fabrication of stressed parts. N-A-X High-Tensile Steel is proving its worth in varied war equipment and in essential civilian products . . . bringing to manufacturers the advantages of easy cold-forming, excellent weldability, great strength, and high resistance to impact, wear and fatigue. It is one of America's most *useful* steels.

N-A-X ALLOY DIVISION

GREAT LAKES STEEL

Corporation

DETROIT 18, MICHIGAN • SALES OFFICES IN PRINCIPAL CITIES

UNIT OF NATIONAL STEEL CORPORATION

GREAT STEEL FROM GREAT LAKES

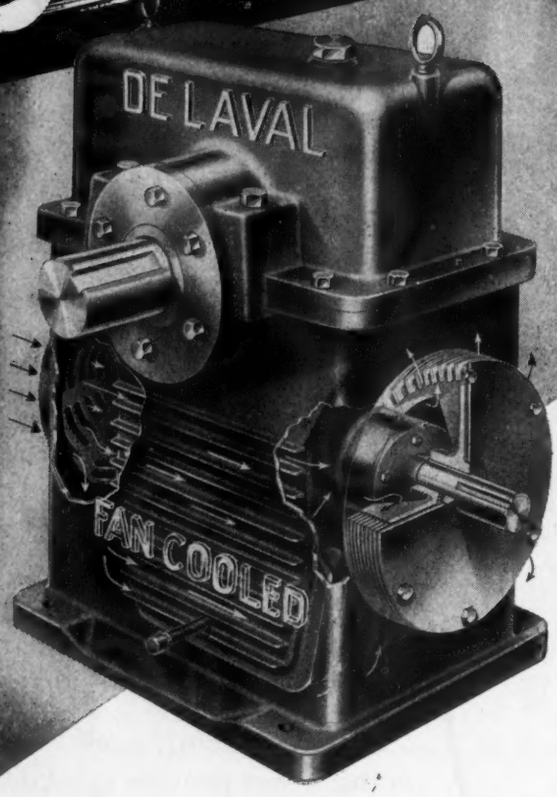
N-A-X 9100 SERIES STEELS for shallow or medium hardening requirements, and N-A-X X-9100 Series Steels (molybdenum-bearing) for depth hardening requirements, provide an all-purpose analysis to yield properties in both carburizing and constructional ranges of carbon.

N-A-X ARMORPLATE, used in practically every type of landing craft and in scores of combat vehicles, gives evidence of the strength and ruggedness that characterize N-A-X low-alloy steels.

SOON AVAILABLE

NEW FAN-COOLED

DE LAVAL WORM GEAR



HIGHER CAPACITY

Capacity is approximately doubled for all ratios at 1750 r.p.m. as compared with standard heavy duty units of the same frame size.

LOWER COST PER HORSEPOWER

Operation at higher ratings permits the use of correspondingly smaller and less costly units.

SMALLER SIZE

Reduction of as much as two frame sizes in some instances. The use of smaller, lighter units results in a saving both of floor space and of critical materials needed for the war effort.

The *NEW* DE LAVAL *FAN-COOLED* WORM GEAR SPEED REDUCER

will soon be available in a complete line of sizes. Send for literature now being prepared.

1149

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WORM GEAR DIVISION

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Design that part in ArmaSteel*

The metal that replaces forgings; cuts machining time up to 60 per cent

Cast to conform closely to final shapes, ArmaSteel reduces the amount of metal to be removed, eliminating up to 60 per cent of machining time. In addition, ArmaSteel gives 10 to 50 per cent better machinability with a 20 to 100 per cent increase in the number of parts finished per tool grind. Experience in the production of a particular gun part resulted in nearly 15,000 pieces being obtained per tool grind without the use of a coolant.

Gun parts weighing less than a pound, and Diesel locomotive pistons weighing more than 50 pounds, have been cast successfully with ArmaSteel.

To industries awaiting "Go Day" on civilian production we suggest keeping ArmaSteel's war record in mind when setting up production programs. Parts can be made faster, better, cheaper with ArmaSteel castings.

PROPERTIES . . . QUALITIES

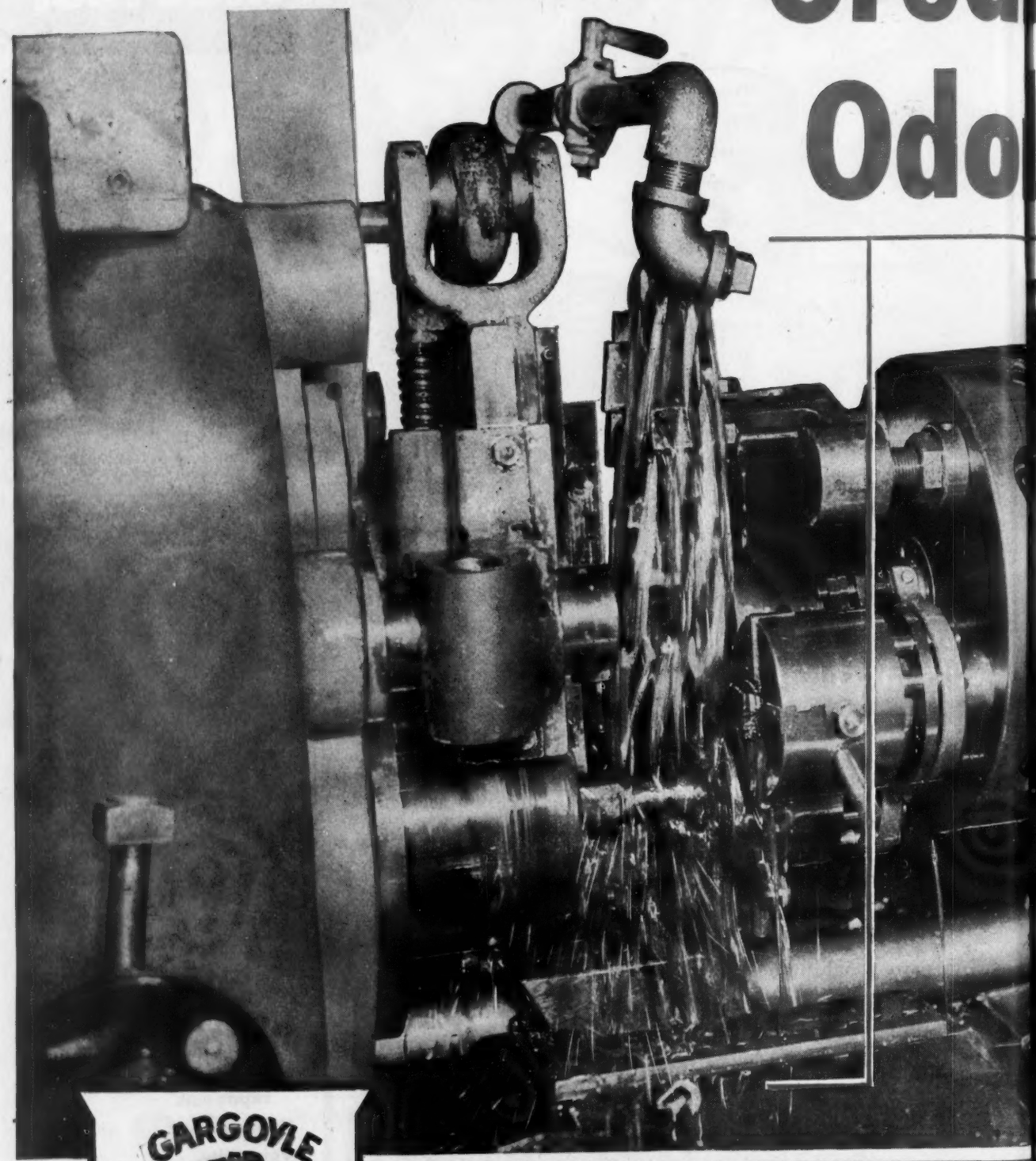
- Cast to conform closely to final shapes.
- Excellent machinability.
- Hardenability comparable to 5040-A steel.
- Ready response to selective hardening.
- Good fatigue life.
- Excellent bearing properties (eliminates need for bushings in many applications).
- Polishes to mirror finish.
- Low co-efficient of thermal expansion.
- High strength.
- Versatility.
- Good corrosion-resistance.

First Things First
BUY WAR BONDS

SAGINAW MALLEABLE IRON DIVISION OF GENERAL MOTORS
SAGINAW, MICHIGAN

*Reg. U. S. Pat. Off

SOCONY-VACUUM ANNOUNCES Grea N Odo e

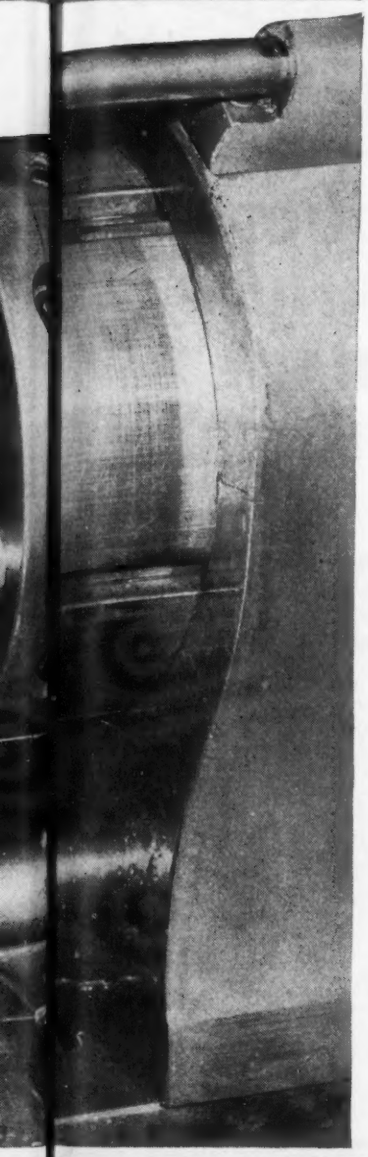


GARGOYLE

Lubricants

SOCONY-VACUUM'S FIVE STEPS
TO LOWER PRODUCTION COST

New Transparent ess Cutting Oils!



NEW S/V SULTRANS ALREADY PERMITTING GREATER PRODUCTION, LONGER TOOL LIFE AND IMPROVED FINISH ON MORE OPERATIONS THAN PREVIOUS OILS!

ANTICIPATING current metal-cutting needs, Socony-Vacuum has developed, and is now announcing, a new line of light-colored, transparent, odorless cutting oils.

These oils, the new S/V Sultrans, have already proved their superiority over other cutting oils in exhaustive field tests, and are now in service on many operations.

See the Work Better!

In addition to better visibility of the work, and no odor to cling to operators' clothing, the new oils also provide:

Outstanding lubricity for greater protection to the boundary area of cutting tools; *less sensitivity* to changes in the hardness and structure of metals and speeds and feeds of cut, permitting *wider application; improved drainability* for lower consumption; and generally all-around *better performance* for longer tool life and improved finish.

Available Right Now!

All of these improvements have been added without sacrificing any of the anti-weld and pressure resistance characteristics of previous Socony-Vacuum cutting oils.

The new S/V Sultrans are available now for your cutting operations. Ask your Socony-Vacuum representative for further details.

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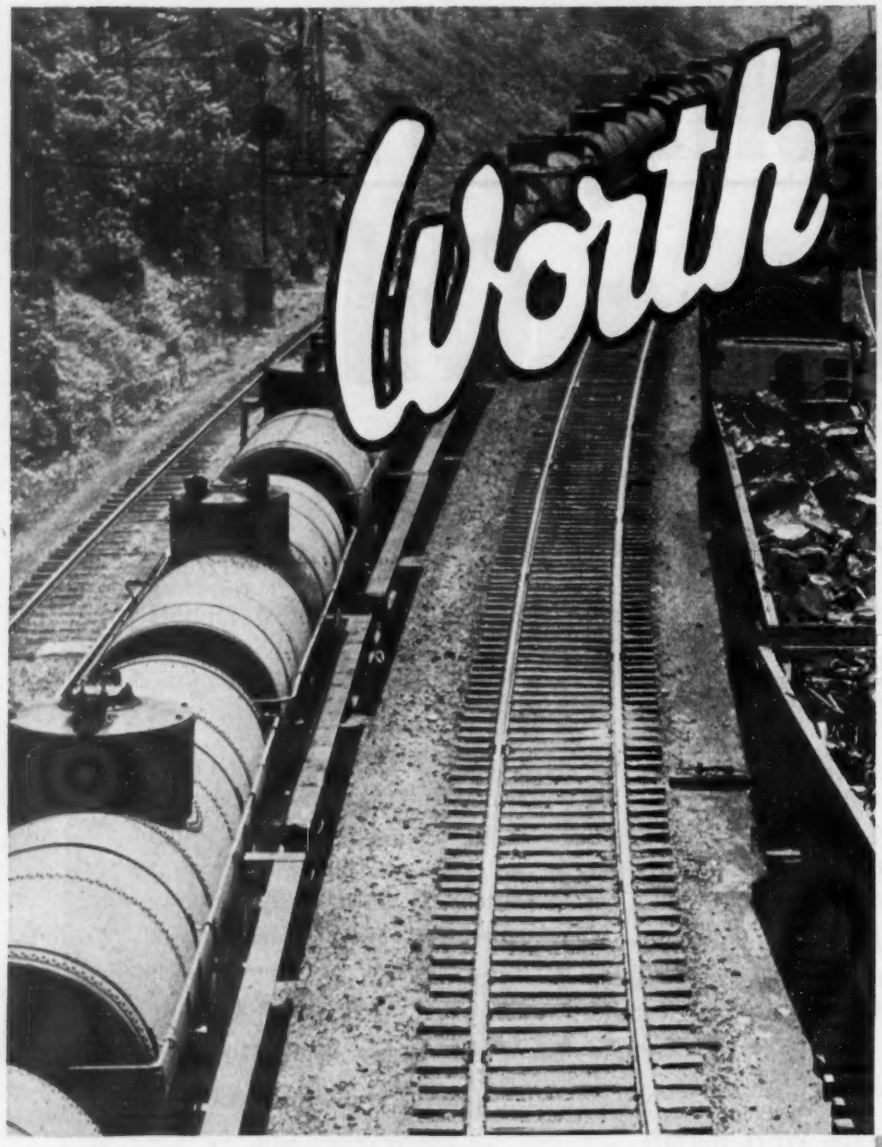
1. Lubrication Study of Your Entire Plant
2. Lubrication Schedules and Controls
3. Lubricant Storage and Handling System
4. Skilled Engineering Counsel
5. Progress Reports of Benefits Secured

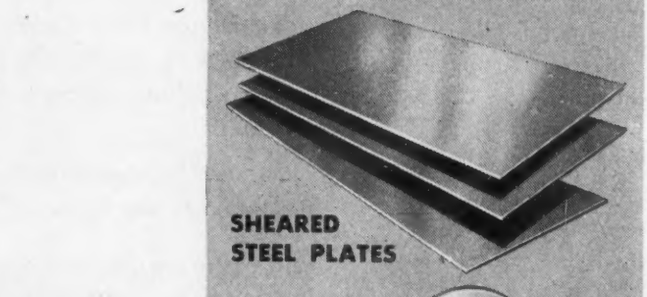


STEEL PLATES

. . . . . are doing their part in the

PRODUCTION REFINING STORAGE & TRANSPORTATION *of* OIL

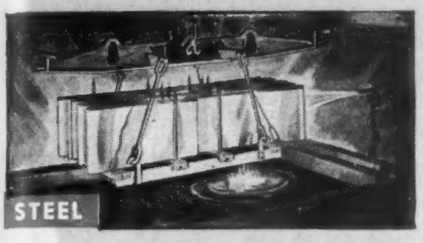
Yes, plates for the fabrication of Stills, Bubble Towers, Tanks, Heaters, Condensers, Boilers, Stacks, Vats, Piping, Tank Cars, Structural Work, etc., etc.,—are regularly supplied by Worth. Flanged and Dished Heads from 9½" to 216" O. D., and from 3/16" to 4" thickness to any specifications are also made by Worth.



WORTH

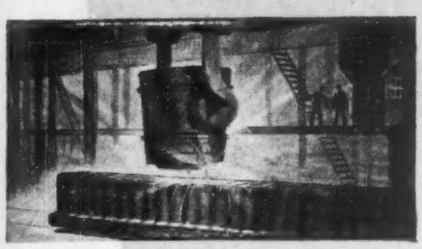
WORTH STEEL COMPANY · Claymont, Delaware

SPECIFY "GENERAL CHEMICAL"

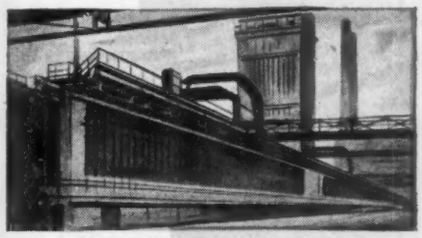


PICKLING—Sulfuric Acid—Hydrofluoric Acid—Muriatic Acid—Nitric Acid—Phosphoric Acid—Chromic Acid.

Detergents: Sodium Metasilicate—Trisodium Phosphate—Sodium Silicate—Tetrasodium Pyrophosphate.

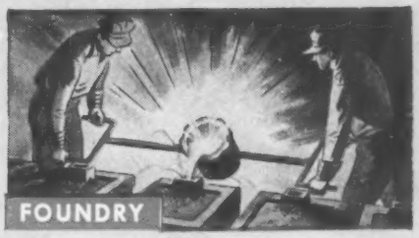


RIMMING STEEL—Sodium Fluoride for smoother-surface rimming steel.



COKE BY-PRODUCTS—Sulfuric Acid for making ammonium sulphate; also for washing toluene and benzene, and for treating light oils.

quality chemicals for the metal industry



Casting Cleaning Acid (Hydrofluoric Acid)—Sodium Silicate—Zinc Chloride—Polyacid Fluoride—Chromic Acid—Ammonium Fluoborate—Sodium Fluoborate—Potassium Fluoborate.

Anti-oxidants and inhibitors • Potassium Fluoride—Lithium Fluoride and Other Welding Fluxes • Fluoboric Acid: Solvent for silica, in cleaning surfaces.

Sodium Cyanide—Sodium Fluoride—Sodium Cyanate—Potassium Cyanate.

Lead Fluoborate—Tin Fluoborate—Zinc Fluoborate—Cadmium Fluoborate—Copper Fluoborate, etc.

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For Fast, Low-Cost Cleaning of *Die Castings*

Use OAKITE MATERIALS SPECIALLY DESIGNED *for this work!*

FREE DIGEST Describes Successful Surface Preparation Techniques and Materials

Volume output, low production cost and good adhesion of organic, chemical or plated finishes are largely dependent on the correct surface preparation of die castings and the use of the right cleaning material and method for each alloy. Because it comprehensively covers these important operations, all producers and users of die castings should have a copy of the NEW Oakite Digest titled "Production Cleaning of Die Castings".

Your Free Copy Mailed on Request

Just off the press, this Digest describes Oakite techniques and materials for the surface preparation of die castings prior to painting, lacquering, plating, anodizing, black finishing, Bonderizing, Alroking and other finishing operations. Page after page gives you practical data you can apply and use on your work. Since there is no obligation, won't you write for your free copy today?

OAKITE PRODUCTS, INC., 26 Thames St., New York 6, N. Y.

Technical Service Representatives Located in All Principal Cities of the United States and Canada

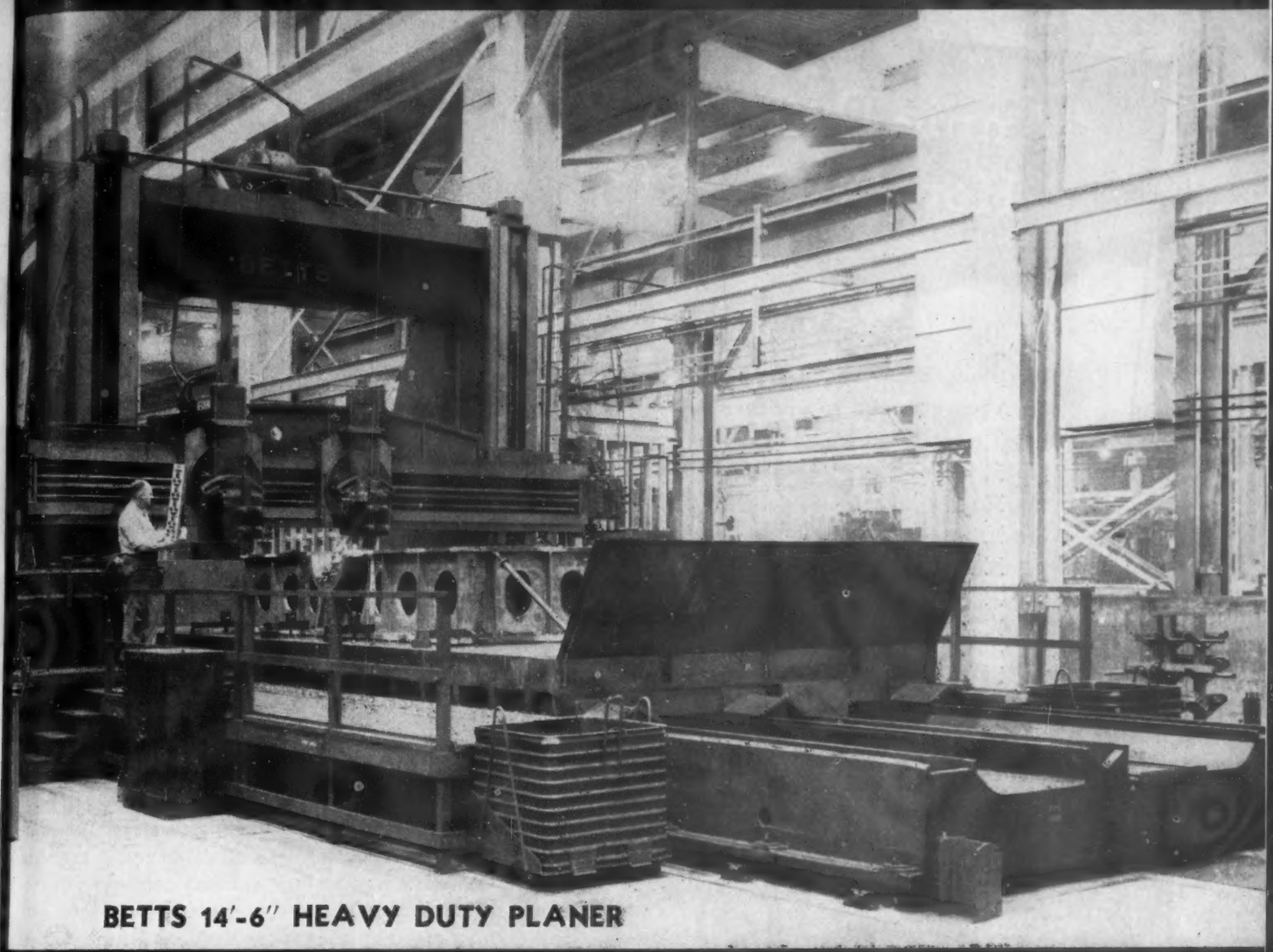
Partial List of Contents

- Cleaning aluminum die castings before organic finishing
- Alkaline and solvent methods
- Stripping anodizing film
- Cleaning zinc die castings for chemical and plated finishes
- Cleaning before dichromating
- Cleaning before Bonderizing
- Electro and mechanical cleaning methods on magnesium die castings
- Cleaning antimonial lead alloy castings
- Cleaning brass, bronze and copper alloy castings
- Cleaning tin alloys, Brittania metal, white metal
- Stripping black finishes from non-ferrous die castings
- Cleaning die casting machines, steel dies

OAKITE MATERIALS METHODS SERVICE

CLEANING FOR EVERY CLEANING REQUIREMENT

WHEN LOWER COST PRODUCTION REPLACES COST PLUS...



BETTS 14'-6" HEAVY DUTY PLANER

PLANING TURBINE HOUSINGS IN A WELL-KNOWN INDUSTRIAL PLANT

Consolidated Machines, designed and built for maximum economical production, offer you a foundation for meeting post-war competition on a profitable basis. Whether your problem needs answering today, or you are trying to reach the solution for a post-war development, you should find it worth-while to investigate Consolidated Heavy Machine Tools.

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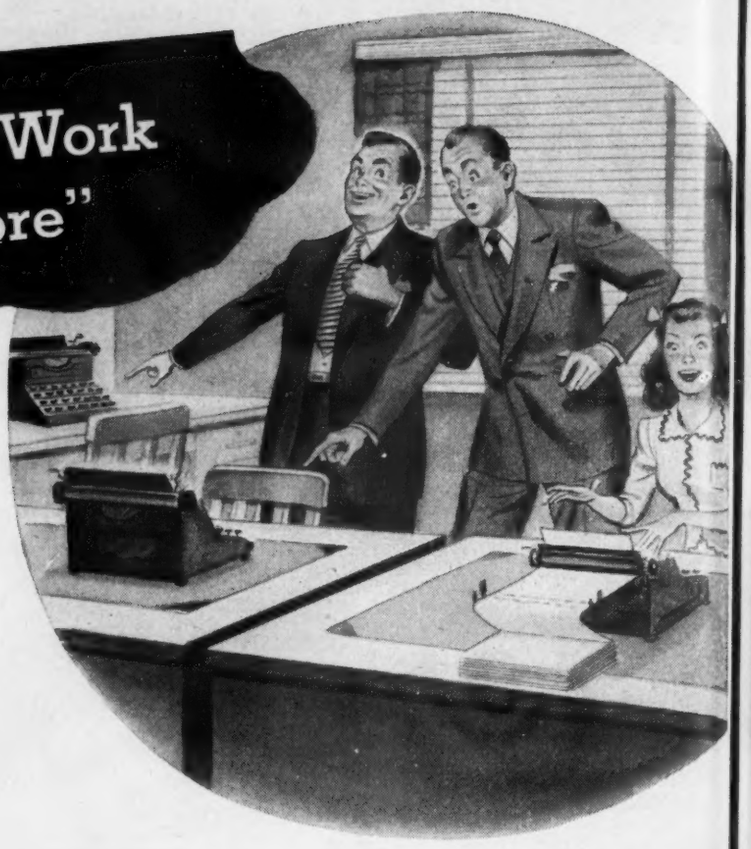
"Annie Doesn't Work Here Any More"



Nor does Tillie, her assistant. Both were moved to another department. Why? Well, by combining records with Uarco **continuous-strip** forms, *one* person can handle the record writing for all departments. Results show a rise in efficiency . . . time saved . . . fewer errors.

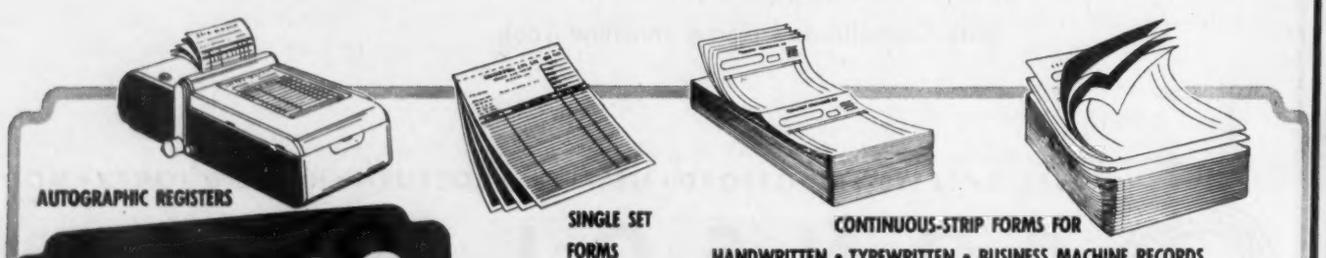
Combine Records with UARCO Continuous-Strip Forms

For example, with Uarco **continuous-strip** forms, a system—consisting of an invoice in duplicate, a sales department copy, a statistical copy, a bookkeeping copy, a delivery receipt in duplicate, a packing slip and shipping label—was combined into one *writing.* Hence, one person at one typing handled all the record writing. Saved time and expense as well as eliminating the confusion and errors caused by *separate* writing of the *same* information.

However, Uarco **continuous-strip** forms are tailor-made to meet *individual* problems. Different problems are solved by different Uarco records. Briefly, these record forms are perfectly aligned, multiple-copy forms which are scientifically designed to eliminate errors and needless duplication of work . . . record forms that keep the flow of work moving smoothly, efficiently.

It will cost you nothing to have a Uarco representative work with you. Telephone today . . . or write for added information.

UNITED AUTOGRAPHIC REGISTER COMPANY
Chicago, Cleveland, Oakland • *Offices in All Principal Cities*



UARCO

BETTER BUSINESS RECORDS

HARDENED AND GROUND ROLLS

Forged rolls have long been a Midvale specialty. Their making is always a challenge, and especially so when the requirements of their use present a new problem in analysis, hardening or finish. In this, as in other phases of custom steel work, experience must be paralleled with equipment and all must be surmounted by extraordinary skill in workmanship.

THE MIDVALE COMPANY • NICETOWN • PHILADELPHIA

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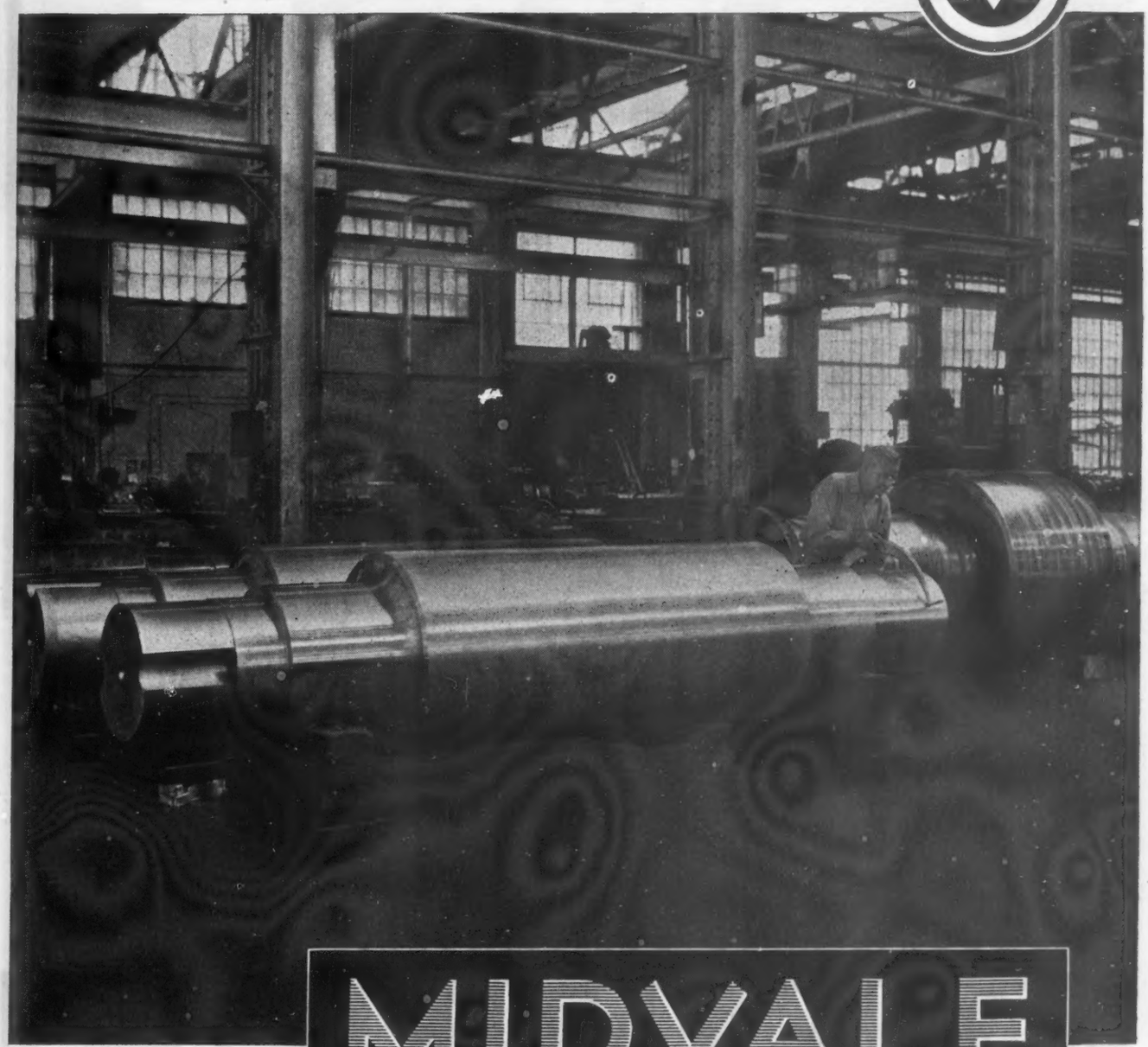

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Custom Steel Makers to Industry

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If you have never tried WASHBURN MUSIC WIRE you are in for a pleasant surprise. Make tests NOW for your present or future product.

Write us the details of YOUR problem

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WASHBURN

CLEAN UNIFORM BILLETS—STRIP—RECTANGULAR, ROUND, FLAT RODS
TEMPERED AND UNTEMPERED FLAT AND ROUND HIGH CARBON WIRES

This Statement We Know to be True . . . ON ANY FULLY AUTOMATIC MACHINE TOOL, PERFECTED LUBEWELL CUTTING COMPOUND WILL OUT-PERFORM ANY CUTTING OIL OR WATER SOLUBLE LUBRICANT REGARDLESS OF THE TYPE OF WORK BEING PERFORMED.

Prove this statement at our risk. G. Whitfield Richards will send you any quantity of Perfected Lubewell for use on any automatic machine tool.—If you find that it doesn't 1. increase tool life up to 50%; 2. increase production speed of the machine up to 25%; 3. give a superior finish and hold to closer tolerances; 4. lower cutting lubricant cost as much as 40% . . . you may tear up the bill. Better performance from coast to coast at 3 to 9 cents per gallon in the machine. Write, phone or wire for your trial order today.

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PIONEERS OF *Water Soluble Cutting and Drawing Lubricants*

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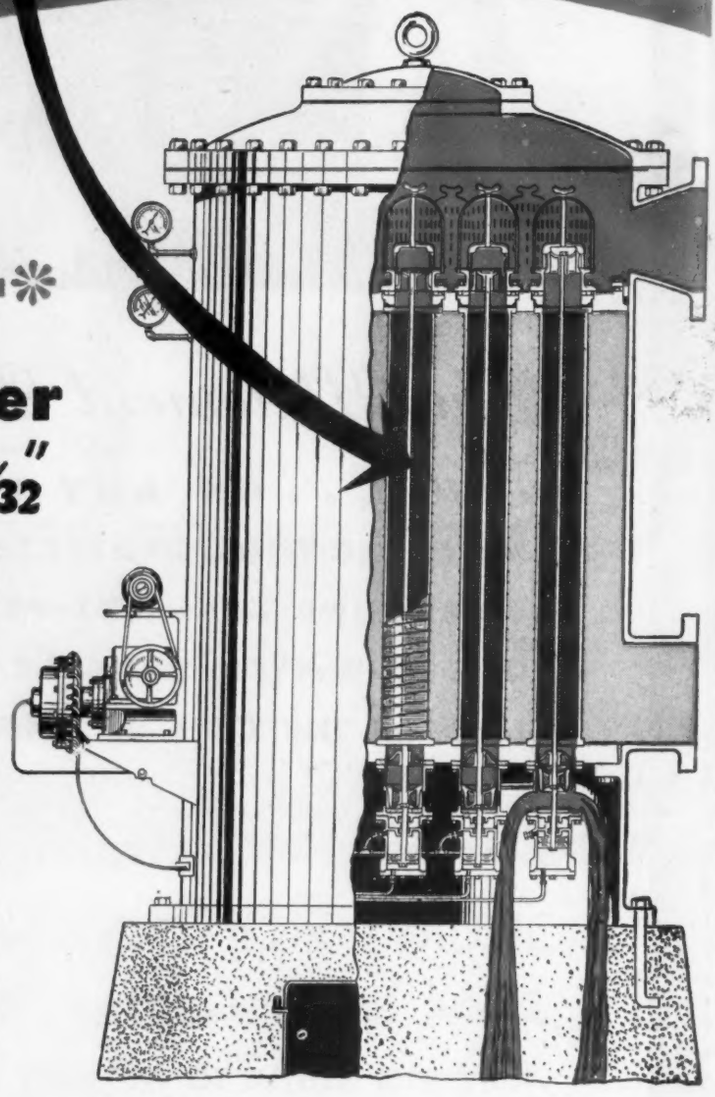
ADAMS AUTOMATIC WATER FILTERS

Remove GRIT and DIRT* from River Water

*15 times finer than 1/32"

Adams *Poro-Screen* Filters offer a practical answer to large-scale filtration of dirty river water for use in hydraulic equipment. Designed for continuous, automatic operation and requiring a minimum of attention, Adams Automatic Filters supply the required volume of clean water for your operations—water free of dirt and grit which damage bearings, rolls, valves and other equipment. Highly successful on water cooling installations of open-hearth and heat-treating furnaces.

Adams Automatic Filters provide low velocity filtration. Their multiple tube design has no moving clearances, is fully automatic. One tube is back washed at a time while filter is delivering full rated capacity. Adjustable control gives flexibility of back-washing—excessively dirty water more frequently, normal water less frequently. Built in four sizes from 300 gpm. to 2000 gpm. Write for Bulletin 901.



★ R. P. ADAMS COMPANY, INC. ★

75 CHICAGO STREET, BUFFALO, N. Y.

ADAMS PORO-STONE AND PORO SCREEN FILTERS

"How about economical TOOLING for those STREAMLINED designs?"

Often, when designing a product for greater eye-appeal or improved utility, a coordination with efficient tooling is not given sufficient consideration. Result . . . slow production, high cost, competitive disadvantage.

One remedy for such a situation will be found in employing Atlas . . . an organization of 300 skilled Engineers, Designers and Toolmakers, with one of the best equipped plants in the East. Atlas product designers work in close association with their engineers and toolmakers . . . as well as your key men . . . to design product, tools, dies, jigs, assembly and testing equipment, if required, and in many instances, special automatic machinery for economic manufacture.

Atlas technicians have served scores of America's leading industrial concerns before and during the war in such fields as transportation, textiles, machine tools, printing machinery, motors, radios, cameras, electronics, aviation, stoves, air conditioning and refrigeration . . . and of late, designing and tooling for tank parts and guns, anti-aircraft, electrical weapons, shells, engine starters, superchargers, including complete production lines for the precise manufacture of vital war material.

On request we will gladly send you an Atlas Brochure which gives a clear picture of Atlas operations, machine shop sections, together with their modern equipment, and a partial list of Atlas clients, a veritable "Who's Who" in industry. Send for your copy . . . then "call Atlas".

A load off your shoulders onto ours

ATLAS TOOL & DESIGNING COMPANY
METAL STAMPING COMPANY
Castor & Kensington Avenues, Philadelphia 24, Pa.

then he said to himself

"You're in it for life!"

To those who look at postwar simply as a date on the calendar, the words of Charles F. Kettering, Vice-President, General Motors, add *duration* to that date. Says he:

> "We ought to pay more attention to the future. We ought to pay more attention to it than we do to the past, because every one of us is going to spend the rest of his life in it."

What sort of a life that may be is governed largely by what a man does for his product

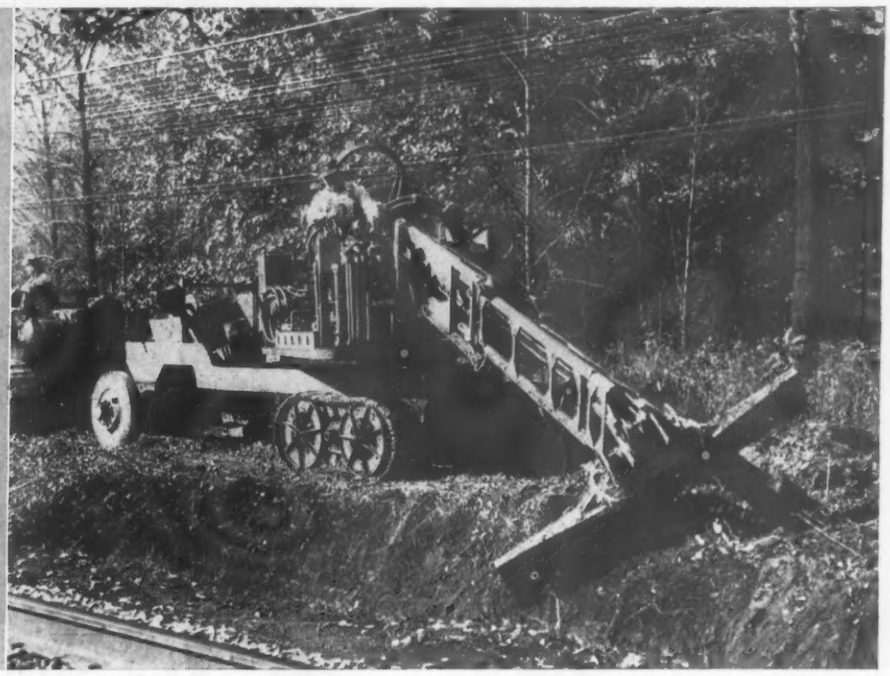
> . . . for it is "Boss" Kettering's contention that he is *not* boss . . . that the machine he is working with is *always the boss*. If he is not doing the right thing for the machine, the machine will not do the right thing for him.

Practicing that philosophy, many men are making products that will assure a successful future.

"Pay Attention to the Future," *he says*

LOOK, MR. KETTERING, how recourse to Arc Welding provides the key to success for ideas in machine design:

MAN WITH AN IDEA STRIKES PAY DIRT WITH WELDED DESIGN



DRAINAGE experience in his homeland Holland and in America taught Ray Ferwerda the need for a machine that would work with the maneuverability of a man with a rake, with his earth-moving power multiplied many thousand-fold.

Thinking in terms of *welded design,* Mr. Ferwerda developed such a machine and improved it until today it is unique in the field of finish-grading equipment.

This man is now president of the F. W. F. Corp., Cleveland, Ohio, manufacturers of the "Gradall" shown above. This machine does many jobs such as the finishing of highway slopes and ditches at about 1/10 the cost of manual grading . . . opens up entirely new fields for progress with better, low-cost drainage.

The strong, welded steel arm of this versatile machine reaches out and pulls dirt . . . or scoops it up and swings it away. All movements of boom and blade are controlled hydraulically. The boom is telescopic and, because of its rigid tubular construction, can be extended 12 feet to a total length of 25 feet.

This is typical of many success stories in which *welded design* has provided potent brainpower for a man's climb upward.

Are you taking advantage of Arc Welding as a means of assuring a secure future? The Lincoln Engineer nearby will be glad to assist you.

THE LINCOLN ELECTRIC COMPANY • Cleveland 1, Ohio

America's greatest natural **recourse**

ARC WELDING

All over the Home Front

ON REPAIR AND MAINTENANCE WORK

P&H HARMOMANG

A Proved Electrode For *high* Resistance to Impact, Abrasion and Wear

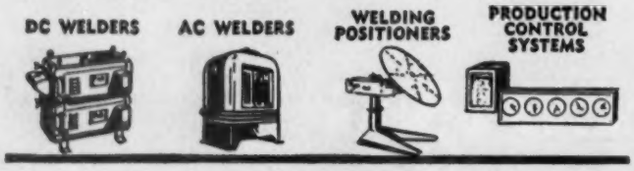
Harmomang is an electrode with the work-hardening qualities which suit it especially for the building up or hard surfacing of manganese and carbon steels.

It is a coated moly-manganese electrode with a hardness range up to 43-46 Rockwell "C". It can be used on AC, or for either straight or reverse polarity on DC.

Harmomang is the ideal electrode to use wherever you need protection against both impact and abrasion. For example: for hard surfacing dipper lips, dipper teeth, bucket runners, rock crushers, railway frogs or wherever longer life is desired for parts made of manganese or carbon steels.

Write direct for full information and procedures or see your P&H representative.

A COMPLETE ARC WELDING SERVICE



50 YEARS P&H SERVICE OF SERVICE

P&H Alloy ELECTRODES

General Offices:
4411 W. National Ave., Milwaukee 14, Wis.

HARNISCHFEGER CORPORATION

WELDING ELECTRODES • MOTORS • HOISTS P&H ELECTRIC CRANES • ARC WELDERS • EXCAVATORS

Canadian Distribution: The Canadian Fairbanks-Morse Co., Ltd.

"Our Plymouth is Swell . . . Efficient . . . Never Laid-up for Repairs!"

That flat statement of proved Plymouth performance was made at the Grasselli Works of General Aniline & Film Corporation. Used for all yard drilling—moving box cars, gondolas and chemical cars, as many as six at a time—General Aniline's 14 ton Plymouth Gasoline Locomotive delivers loads where they want them, when they want them.

And so it is with Plymouth—everywhere. Hustling, providing topgrade performance, moving more tonnage . . . *faster and at lower cost* . . . under the roughest, toughest haulage conditions in steel mills, industrial plants, shipyards, docks and supply depots all over the world.

So, if you are looking for unfailing transportation performance, now is the time to take advantage of Plymouth's rugged, flexible power . . . Plymouth's minimum upkeep and low-cost operation. Write today for full details.

TRACK HAULAGE IS CHEAPER HAULAGE

PLYMOUTH LOCOMOTIVES

GASOLINE, DIESEL, AND DIESEL ELECTRIC

PLYMOUTH LOCOMOTIVE WORKS • Division of The Fate-Root-Heath Co., Plymouth, Ohio, U.S.A.

The Greeks had a word for it!

The ancient Greek warrior in his chariot, and below, his modern counterpart, the American soldier in an amphibian tank armored with Youngstown steel.

"SIDEROS"--meaning literally "metal from heaven"--was the ancient Greek word for Steel. It had its origin in meteoric iron. It was a precious metal, rarer than silver or gold. Iron, hardened into steel at crude forges, was shaped into spearheads and swords.

Superiority in the use of steel enabled the little armies of the Greek city states to throw back across the Bosphorus and eventually destroy the barbarian hordes of Persia, bent on conquest of the ancient world.

Today, an ever increasing superiority in the use of steel is enabling America and her allies to destroy the twentieth century barbarian enemies of modern civilization.

Tomorrow, with an overwhelming superiority in the use of steel, America must insist on remaining strong and free--to use its steel to preserve a lasting peace and to build a civilization better than any the world has ever seen.

QUALITY YOUNGSTOWN SERVICE

YOUNGSTOWN

THE YOUNGSTOWN SHEET AND TUBE COMPANY

YOUNGSTOWN, OHIO

Manufacturers of

CARBON - ALLOY AND YOLOY STEELS

Pipe and Tubular Products - Sheets - Plates - Conduit - Bars - Electrolytic Tin Plate - Coke Tin Plate - Rods - Wire - Nails - Tie Plates and Spikes - Alloy and Yoloy Steels.

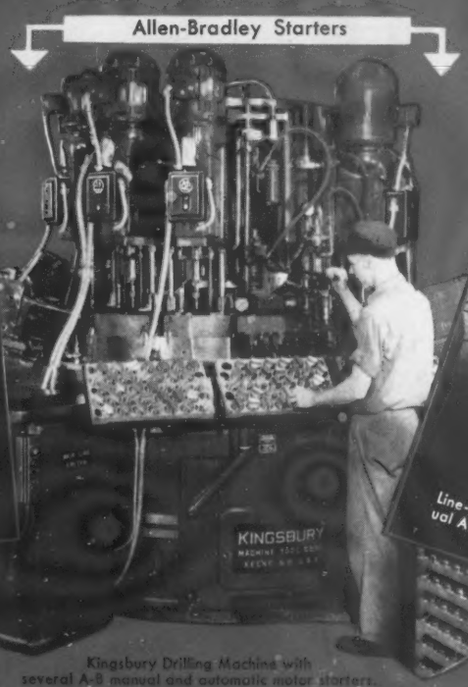
ALLEN-BRADLEY

MOTOR CONTROLS FOR PRODUCTION LINES

QUALITY

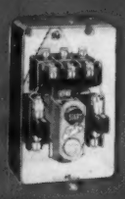
Turntable Unit with 18 centrifugal spinners each with an A-B Bulletin 712 Combination Starter.

Fin Milling Cutters in large automotive plant equipped with A-B control panels mounted in steel safety cabinet.



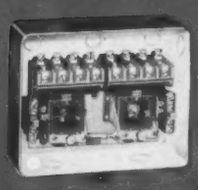
Kingsbury Drilling Machine with several A-B manual and automatic motor starters.

Line-up of Lincoln Welders each equipped with individual A-B Bulletin 609 manual across-the-line starter.

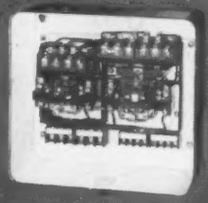


Manual Starter

Automatic Starter

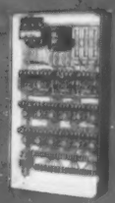


Reversing Switch



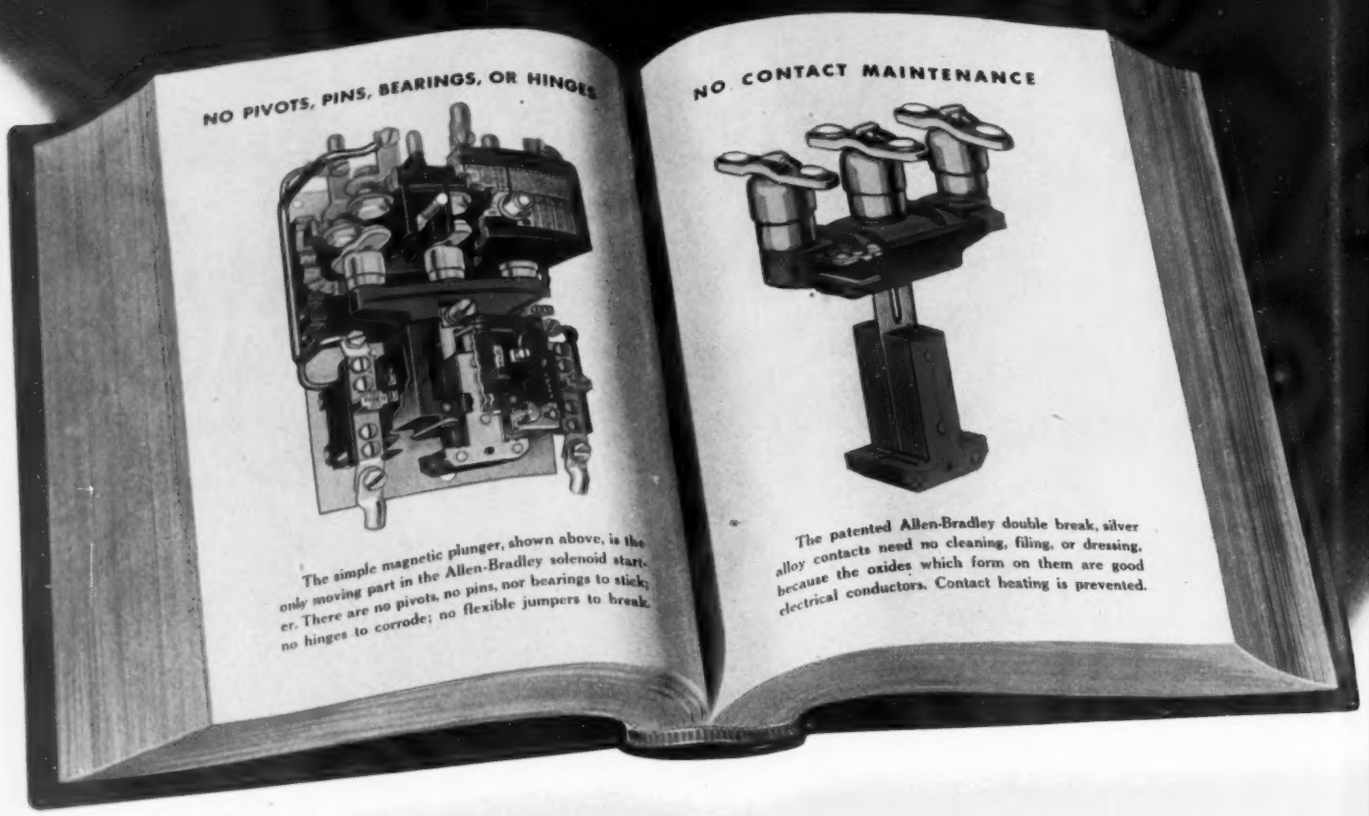
Multispeed Starter

Combination Starter



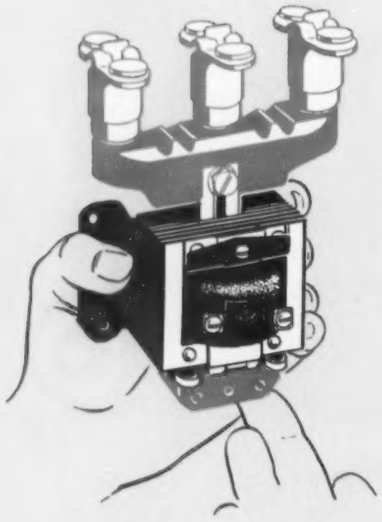
Machine Tool Control Panel

THERE IS AN ALLEN-BRADLEY STARTER TO FIT EVERY INDUSTRIAL APPLICATION


NO PIVOTS, PINS, BEARINGS, OR HINGES
The simple magnetic plunger, shown above, is the only moving part in the Allen-Bradley solenoid starter. There are no pivots, no pins, nor bearings to stick; no hinges to corrode; no flexible jumpers to break.
NO CONTACT MAINTENANCE
The patented Allen-Bradley double break, silver alloy contacts need no cleaning, filing, or dressing, because the oxides which form on them are good electrical conductors. Contact heating is prevented.

The Amazing Success Story of Allen-Bradley Solenoid Starters can be told in 4 words:

"Only one moving part"



The double break, movable contacts of the A-B solenoid starter are mounted on an insulated crossbar which is attached to the simple magnetic plunger.

Every engineer knows... and every maintenance man agrees... that the greatest simplicity in design is the best assurance of trouble-free starter operation. Less parts mean less trouble.

Therefore, when a motor starting switch... like the Allen-Bradley solenoid starter... has *only one moving part,* it is not only the SIMPLEST but also the most trouble-free starter on the market.

The widespread preference of machinery builders for Allen-Bradley solenoid controls accounts for the dominant position of the Allen-Bradley line in recent market surveys. Machinery builders understand the value of a simple design, especially in severe service... so they specify Allen-Bradley solenoid control.

Allen-Bradley Company, 1316 S. Second St., Milwaukee 4, Wis.

ALLEN-BRADLEY
SOLENOID MOTOR CONTROL
QUALITY

Built by John Mohr & Sons, Chicago, Ill., these Monel crates handle steel sheet in pickling operations preparatory to galvanizing. Use of Monel assures long, safe service under corrosive conditions.

How many EXTRA FEATURES does pickling equipment need?

Here are answers that help steel mill speed output and reduce costs

A top-flight job, these crates...

Right now, all four are serving in the galvanizing department of a large midwestern steel mill.

Welded from Monel hot-rolled flat bar, each crate is 124" long and slightly under 40" wide. The sides are of ⅞" x 6" stock; cross members are of ½" x 3" bar. Corner supports are ⅜" x 2" x 21".

Chicago's John Mohr & Sons, prominent fabricators for steel plants, didn't have to hunt for a metal that was strong and tough. Or for one that could be readily fabricated.

They knew Monel's high tensile strength (80-95,000 psi for hot-rolled bar); they knew the inherent toughness which enables Monel to withstand stress and strain caused by load and impact.

They were aware that Monel provides superior resistance to the corrosive attack of pickling solutions other than nitric acid. And—almost equally important—they knew that the use of *standard mill forms* of Monel would result in savings to their customer, not only on initial cost, but later as changes, improvements or repairs were called for.

Those charged with responsibility for maintaining pickling room efficiency are invited to write for further information about the advantages and suitability of Monel in specific pickling applications.

MONEL

THE INTERNATIONAL NICKEL COMPANY, INC., 67 WALL ST., NEW YORK 5, N. Y.

NICKEL (INCO) ALLOYS

MONEL • "K" MONEL • "S" MONEL • "R" MONEL • "KR" MONEL • INCONEL • "Z" NICKEL • NICKEL

Sheet..Strip..Rod..Tubing..Wire..Castings..Welding Rods (Gas and Electric)

Two-Position MULTIPLE TAPPING MACHINE *by Snyder*

This is a special-purpose machine designed and built by Snyder for multiple tapping operations on a large aircraft part.

The part is loaded and clamped in a fixture on a hydraulic sliding table. In the first working station there are vertical and angular tapping units equipped with multiple heads and tapping spindles having individual lead screws. The vertical unit is hydraulically lifted to facilitate loading. In the second working station, there are vertical multiple and single spindle angular tapping units. All spindles have individual lead screws.

The machine is semi-automatic. In first station, the vertical head is moved into position hydraulically and both vertical and angular heads tap a series of holes. The vertical head then returns to rear position and the part automatically moves to second station, and vertical and horizontal heads go through the tapping cycle.

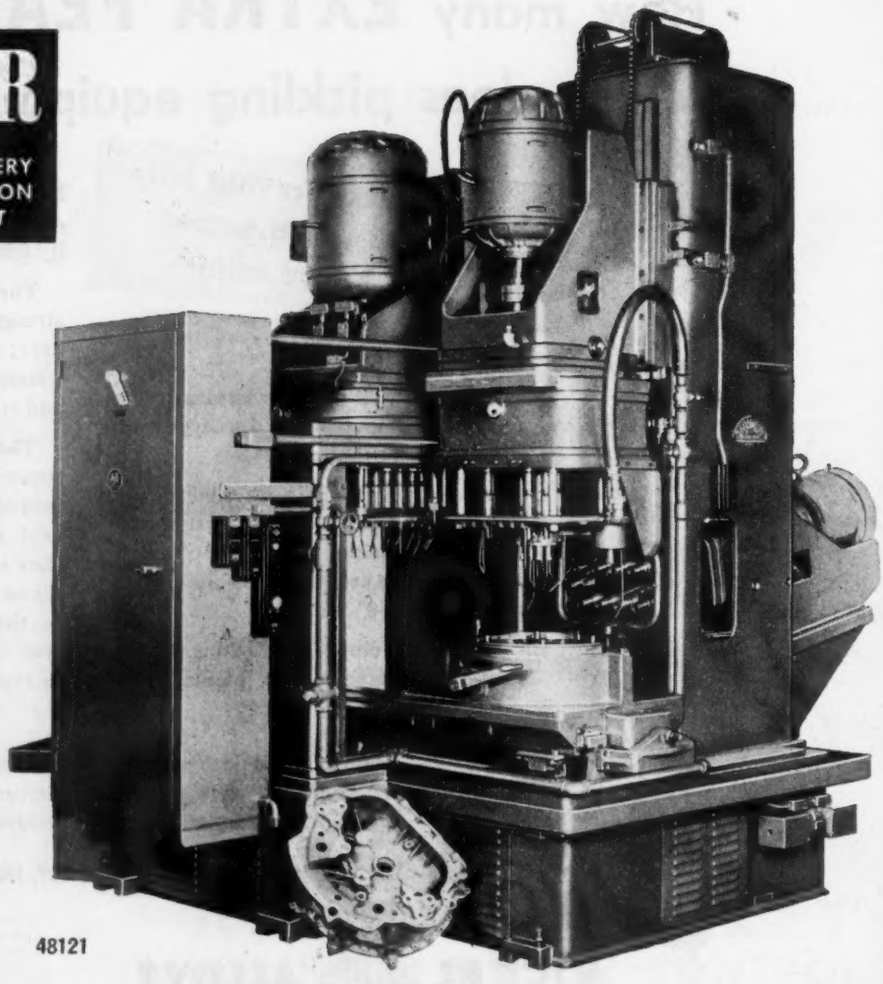
Fixture and slide then automatically return to loading station and the part is finished. All lead screw tapping spindles are equipped with safety spindle ends and floating tap holders. This protects the tap from being broken and the work piece from being spoiled.

The automatic control of quality and precision and the safeguards built into this unit are typical of the efficiency which is engineered into every Snyder special-purpose machine.

More than likely, such machines figure importantly in your post-war production plans, which suggests that you consult Snyder—now. *Snyder Tool & Engineering Company, 3400 E. Lafayette, Detroit 7, Michigan.*

SNYDER
DESIGNERS AND BUILDERS OF MACHINERY FOR HIGH PRODUCTION AT LOW UNIT COST

20 Years of Successful Co-operation with Leading American Industries.



48121

New machines of all kinds will be improved

by the advanced Cast Bronze Bearings

developed for aircraft engines.

In precision, finish, and metallurgical uniformity

Bunting Cast Bronze Bearings, today, surpass

any bronze bearings ever before produced in volume.

The Bunting Brass & Bronze Company, Toledo 9, Ohio.

Warehouses in principal cities. 10

BRONZE BEARINGS ★ BUSHINGS

★ PRECISION BRONZE BARS

Bunting

How to keep out of the "Surplus" Business

It has been estimated that $15 to $20 billions of surplus material will require disposal at the war's end. How will your postwar time and energy be spent—in production, or in the "surplus" business?

As far as steel is concerned, you can trim inventories right now—by buying as you go from a Frasse warehouse. Frasse stocks of cold finished bars, tubing, stainless, alloy and aircraft steels are ample. Tonnage has more than doubled to serve war needs. By using Frasse stocks, you maintain war production, but keep your inventory low—escape dead surplus when cancellations and cutbacks occur.

No need to pile up the "surplus problem" with Frasse stocks handy. Delivery—from a wide range of sizes, shapes and grades—is immediate. To keep up production... keep down the surplus risk... call Frasse.

FRASSE
Mechanical and Aircraft Steels

COLD FINISHED CARBON BARS, SHEETS AND STRIP • SAE, AISI AND NE ALLOY BARS
DRILL ROD • AIRCRAFT ALLOY BARS AND TUBING • STAINLESS STEEL SHEETS, STRIP, PLATES, BARS, WIRE, PIPE AND TUBING • SEAMLESS CARBON AND ALLOY TUBING
SEAMLESS PIPE AND CONDENSER TUBING • WELDED CARBON AND ALLOY TUBING

PETER A. FRASSE & CO., INC. 17 Grand St., New York 13, N. Y. (Walker 5-2200) • 3911 Wissahickon Ave., Philadelphia 29, Pa. (Radcliff 7100 - Park 5541) • P. O. Box 946, Buffalo 5, N. Y. (Washington 2000)
Jersey City 2, N. J. • Hartford 5, Conn. • Rochester 4, N. Y. • Syracuse 2, N. Y. • Baltimore 2, Md.

BUILT BY MORGAN *Engineering*

ONE OF TWO MORGAN 200-TON, 63′0″ SPAN UNIVERSAL TYPE INGOT STRIPPERS IN A MID-WESTERN ELECTRIC FURNACE STEEL PLANT

The Stripper as illustrated will perform three distinct stripping operations without change in the stripping unit.

(1) Strip small-end-up or standard ingots.
(2) Strip big-end-up hot top ingots.
(3) Break small-end-up ingots loose from stools.

With this type of Stripper it is possible to strip a mixed heat without lost time.

Additional Morgan equipment in this plant includes: Two 300-Ton, 65′0″ Span Pouring Cranes. Three 150-Ton, 65′0″ Span Pouring Cranes. Two 150-Ton, 80′3″ Span Hot Metal Charging Cranes.

THE MORGAN ENGINEERING CO.
ALLIANCE, OHIO. 1420 Oliver Building, Pittsburgh.

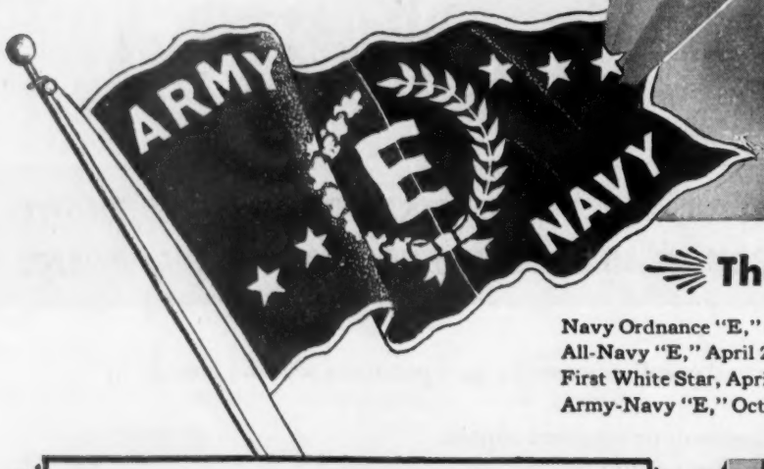
DESIGNERS • MANUFACTURERS • CONTRACTORS • BLOOMING MILLS • PLATE MILLS • STRUCTURAL MILLS • ELECTRIC TRAVELING CRANES • CHARGING MACHINES • INGOT STRIPPING MACHINES • SOAKING PIT CRANES • ELECTRIC WELDED FABRICATION • LADLE CRANES • STEAM HAMMERS • STEAM HYDRAULIC FORGING PRESSES • SPECIAL MACHINERY FOR STEEL MILLS

America's Most Significant Production Award . . . .

the 5th White Star comes to National Forge

A "five star plant" denotes the highest possible recognition that can be earned in war material production. And like military precedent, the 5th White Star can only be earned by "coming up through the ranks"—the preceding four White Stars, as well as the basic Army-Navy "E" Awards, have to be a matter of record before a company is in line for the 5th White Star recognition. And to receive the 5th White Star, the original excellence of production has to be maintained — without interruption — for six, successive, six month periods.

The management of National Forge therefore feels it can announce the receipt of the 5th White Star award with pardonable and understandable pride . . . a pride which fully recognizes that it is National Forge workers who have established this unsurpassed record as award winners . . . and also a symbol, we are sure, that there will be no abatement of National Forge efforts in war production as long as the Army and Navy have need of our services.



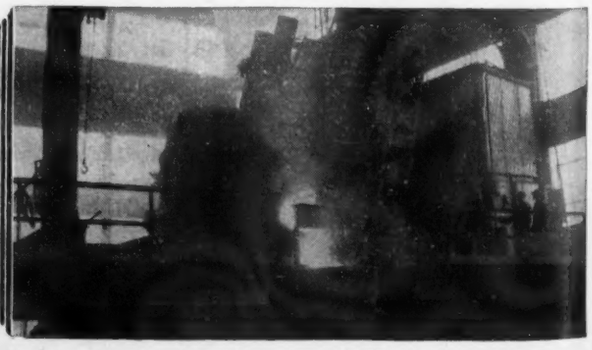
The Record of Awards

Navy Ordnance "E," October 24, 1941
All-Navy "E," April 24, 1942
First White Star, April 24, 1942
Army-Navy "E," October 24, 1942
Second White Star, October 24, 1942
Third White Star, April 24, 1943
Fourth White Star, October 24, 1943
Fifth White Star, October 24, 1944

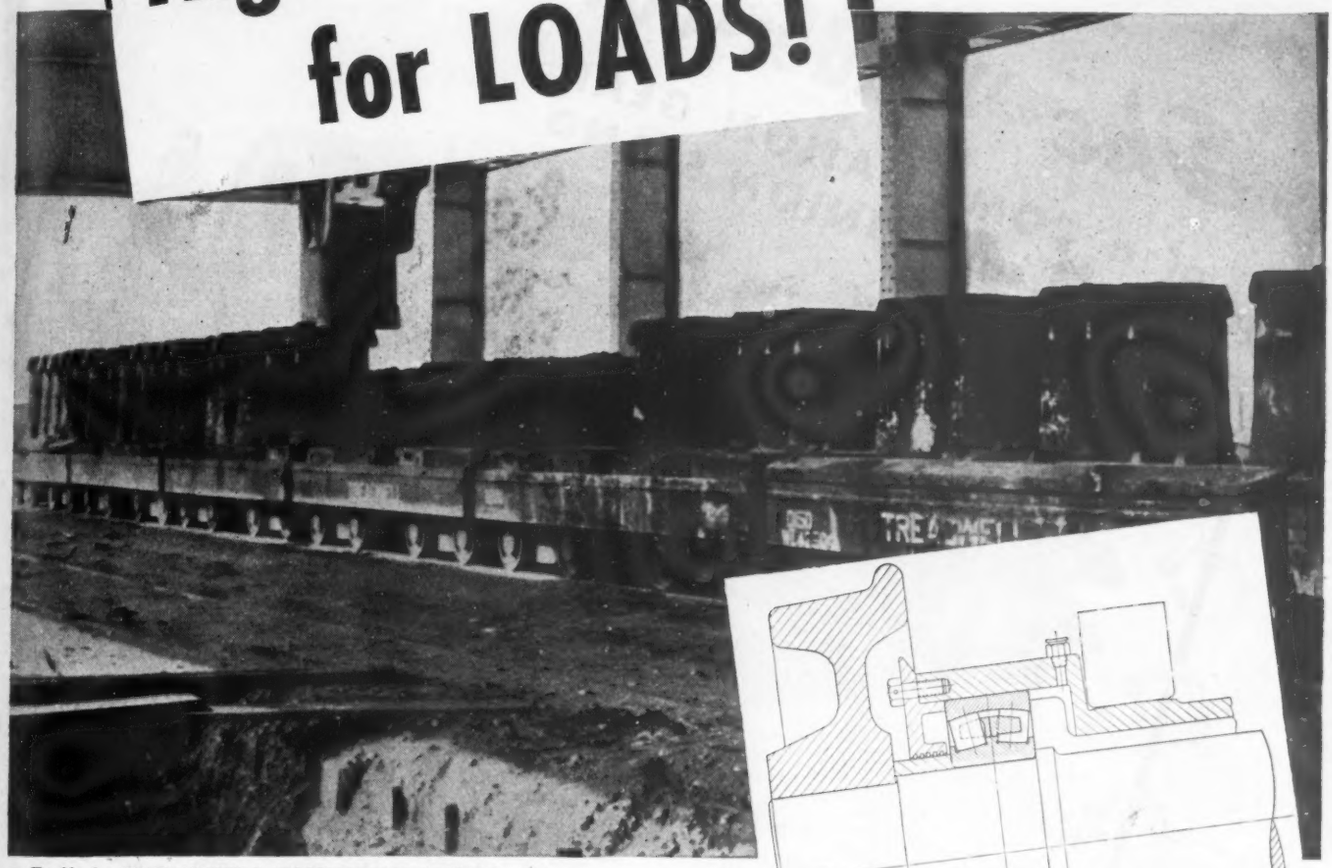
NATIONAL FORGE
& ORDNANCE CO.
IRVINE, WARREN COUNTY, PENNA.
"WE MAKE OUR OWN STEEL"

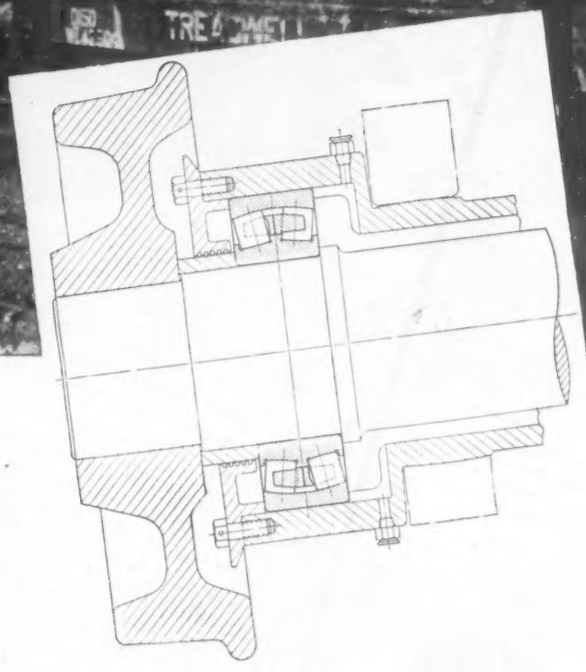
For Excellence E *in Production*

☆ ☆ ☆ ☆ ☆



High Capacity for LOADS!





● *Built by* TREADWELL CONSTRUCTION CO.

When Treadwell installed SKF Spherical Roller Bearings on these ore cars, they put the right bearings in the right places. Warpage or deflections under heavy shock loads cannot reduce the high radial and thrust capacity of SKF's. Because they have self-aligning characteristics, SKF's do not bind—require no adjustment for proper running clearance. They perform smoothly for long periods with only occasional lubrication. Where tonnage is the thing that counts, SKF's do the job. 5746

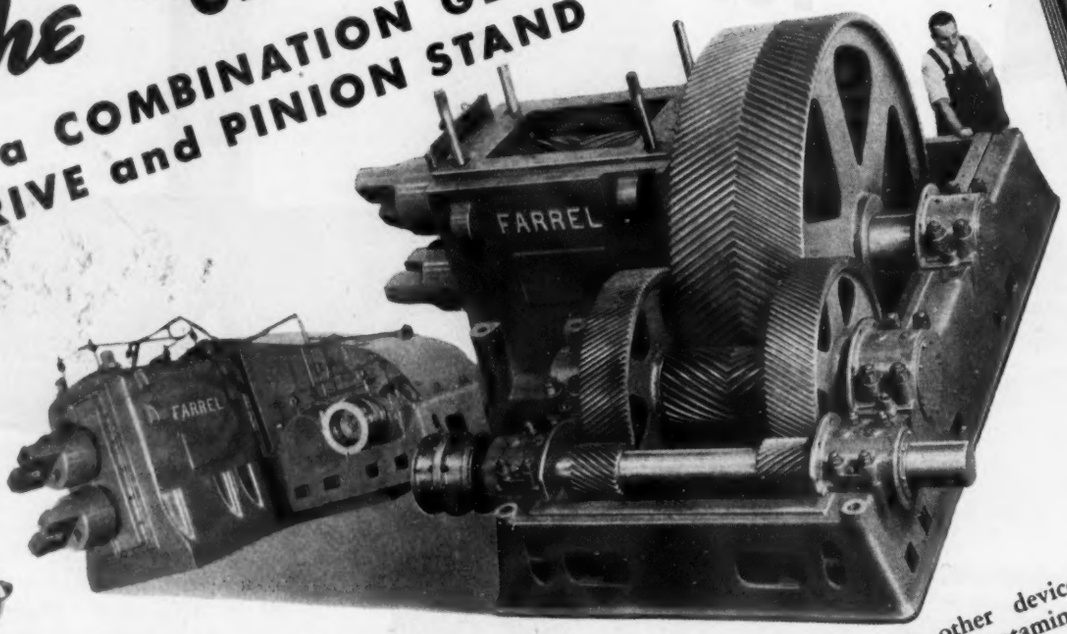
SKF INDUSTRIES, INC., PHILADELPHIA 34, PA.

SKF
BALL AND ROLLER
BEARINGS

Here is...

The "Under-Cover" Story

of a COMBINATION GEAR DRIVE and PINION STAND



This is the main gear of the 1,250 HP drive illustrated at the right. It has Farrel-Sykes continuous herringbone teeth, is 10′ 7″ in diameter, 36″ face, and weighs over 13 tons.

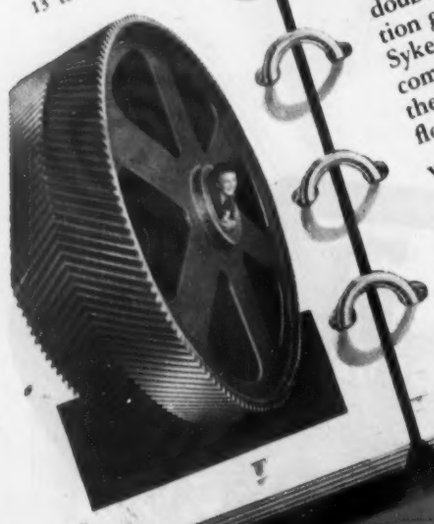
This is the story of gears and pinions and the other "undercover" parts which make a rolling mill drive give a lifetime of satisfactory operation.

The drive illustrated is a combination reduction unit and pinion stand designed to transmit 1,250 HP to a 26-inch two-high mill. The first reduction consists of split (divided) double helical gears, and the second reduction gears and the mill pinions are the Farrel-Sykes continuous tooth herringbone type, a compact gear arrangement which distributes the load uniformly and requires minimum floor space.

With all shafts mounted in roller bearings, friction losses are reduced to a minimum, and efficient operation is further assured by effective lubrication. The main gears are dip-and-splash lubricated from a reservoir of extra large capacity, and the other gears and mill pinions and bearings are force-feed lubricated by separate pump. Automatically self-cleaning oil filters and other devices protect the drive against oil contamination or circulation failure. Housed in a heavy Meehanite case, with welded steel cover for the gear unit, maintenance of correct alignment of gears and pinions is made certain.

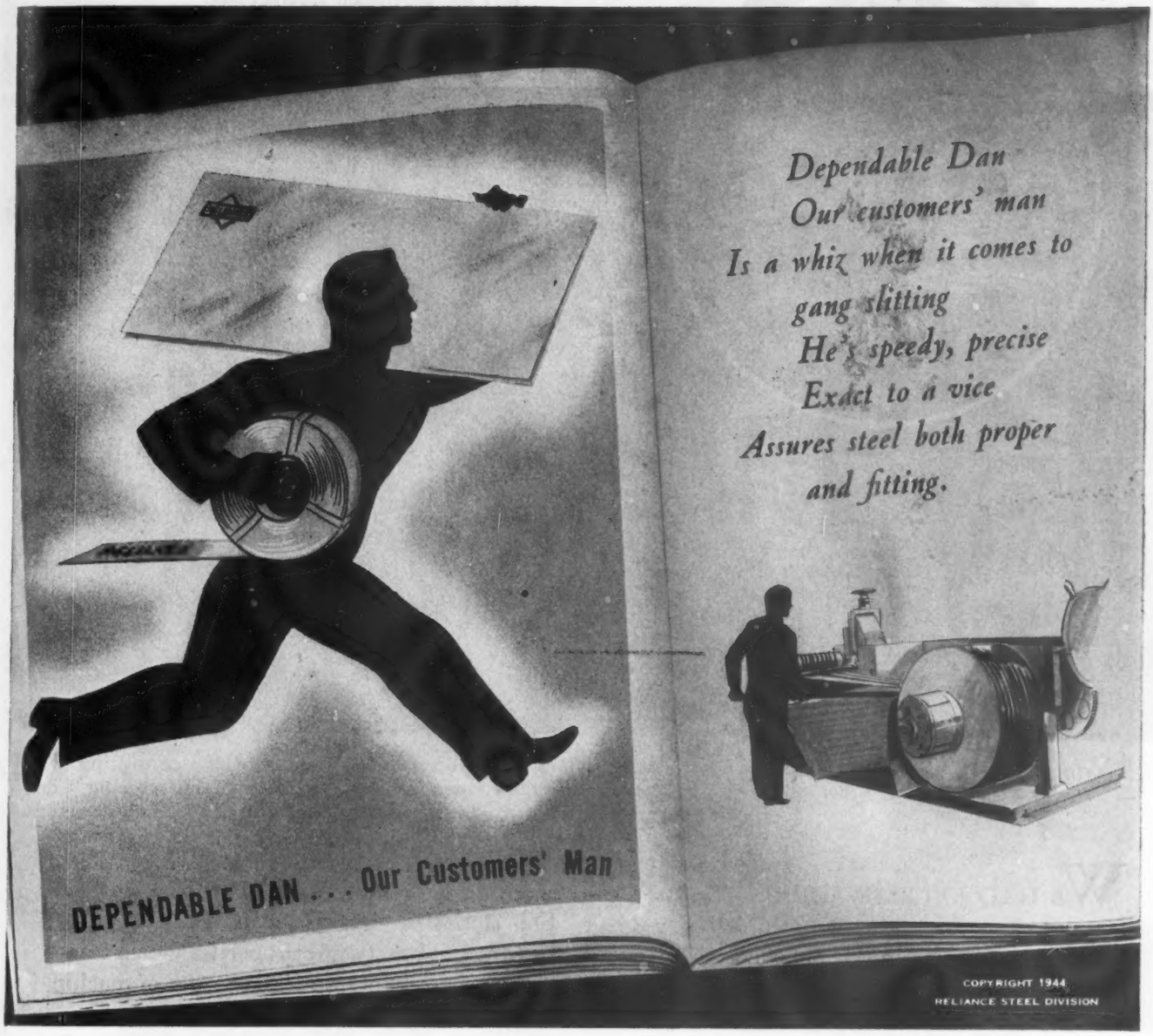
Designed to suit individual requirements, Farrel rolling mill drives and pinion stands—separate or combination units — are available in any capacity. Farrel engineers will be glad to supply full information for any specific application.

FARREL-BIRMINGHAM COMPANY, INC.
ANSONIA, CONN.
Plants: Ansonia, Derby, Conn., Buffalo, N. Y.
Sales Offices: Ansonia, Buffalo, New York, Pittsburgh, Akron, Los Angeles



Farrel-Birmingham

RELIANCE SERVICE...Meets Exacting Requirements...Assures Dependable Deliveries



• PROCESSORS *and* DISTRIBUTORS *of* STRIP *and* SHEET STEEL •

RELIANCE STEEL DIVISION

DETROIT STEEL CORPORATION

General Offices: 1170 Ivanhoe Road, Cleveland 10, Ohio

PLANTS: CHICAGO, CLEVELAND, DETROIT, LYNDHURST, N. J., WORCESTER, MASS.
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RELIANCE STEEL CORP. OF CANADA, WINDSOR, TORONTO
WASHINGTON CUSTOMERS' BUREAU, 300 BOND BUILDING, WASHINGTON 5, D. C.

"WITH GULF CUTTING OILS WE MADE A BIG CUT IN REJECTS AND INCREASED TOOL LIFE"

says this Department Superintendent

Actual photo of a Gulf Service Engineer (left) consulting with Department Superintendent of American Manufacturing Company, Fort Worth, Texas, on the machining of shell adapter rings.

WE HAD EXCESSIVE REJECTS of shell adapter rings when we used soluble oil as the cutting fluid. In addition, main bearing trouble developed in the machine. So we tried Gulf Lasupar Oil and Gulf Cut-Aid, as recommended by the Gulf Service Engineer," says this Department Superintendent. "Now we have a very low percentage of rejects, no bearing trouble, and get much longer tool life."

Again and again, on the most exacting war assignments, Gulf Cutting Oils have made outstanding improvements in production and tool life. Here's the important reason: Every Gulf Cutting Oil has specific properties which insure better performance on certain types of machining jobs!

It will pay every machine shop to learn the full possibilities of Gulf's production-proven cutting oils. Call in a Gulf Service Engineer today and let him show you how they can help you with your machining problems. Write, wire, or phone your nearest Gulf office.

GULF OIL CORPORATION • GULF REFINING COMPANY

Division Sales Offices:
Boston • New York • Philadelphia • Pittsburgh • Atlanta
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GULF INDUSTRIAL LUBRICATION

DON'T MAKE TOOLS WALK TO WORK...

GIVE 'EM A RIDE!

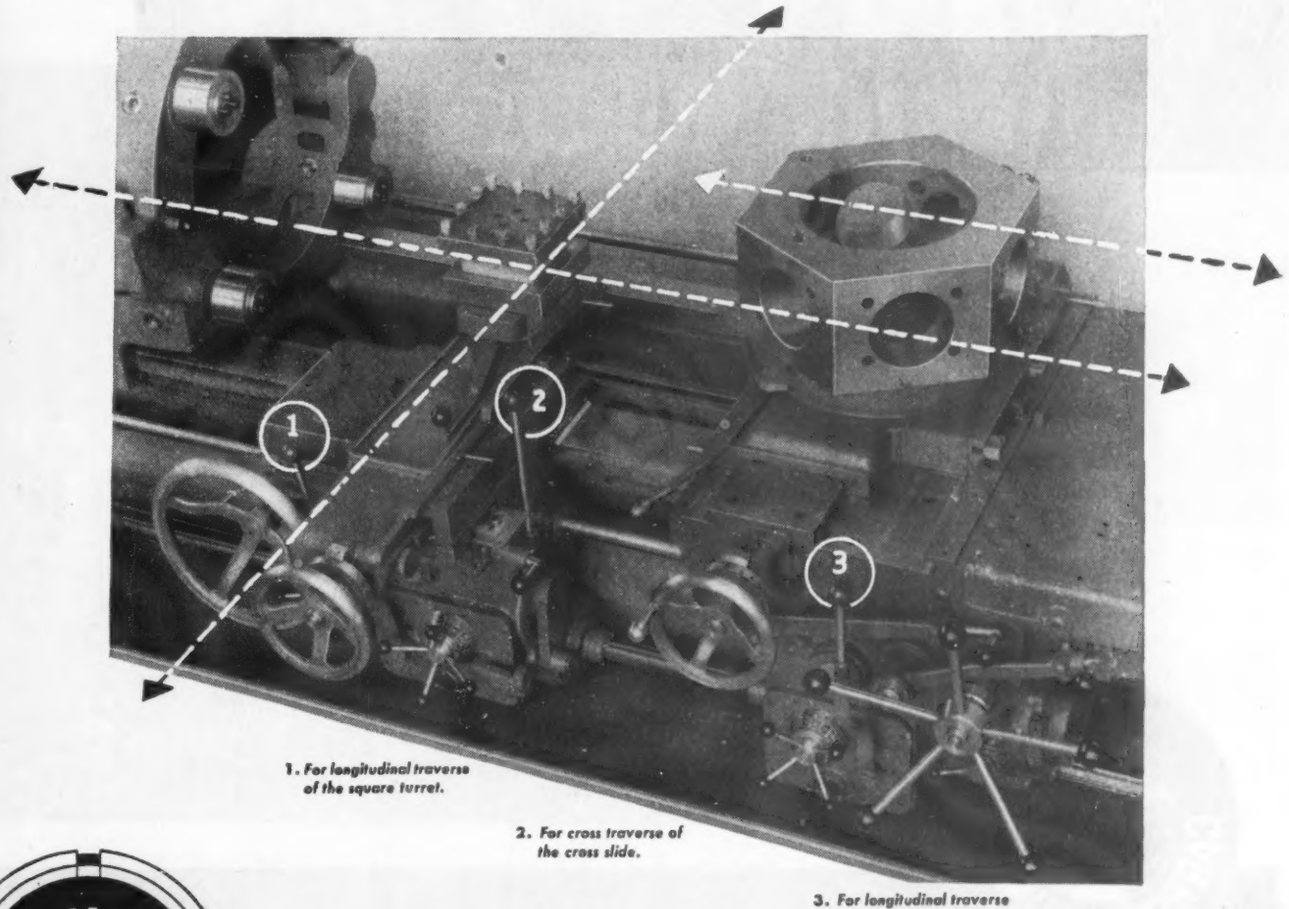
GISHOLT Standard—COMPLETE *Power Rapid Traverse* for ALL Saddle Type Turret Lathes

Here's another good reason why work goes faster on *all* sizes of Gisholt Saddle Type Turret Lathes.

There's longitudinal power rapid traverse for the hexagon turret carriage, of course. Furthermore, you'll find it provided for the longitudinal travel of the square turret carriage, and—an advantage pioneered by Gisholt—for transverse travel of the cross slide.

Quicker movement of tools in and out of cutting position reduces time between cuts. And it relieves the operator of laborious hand-turns—saves as much as one-third of his time on many jobs.

No wonder operators familiar with the *complete* traverse feature are strong for Gisholt. It helps them produce more, earn more, with less fatigue.



1. *For longitudinal traverse of the square turret.*

2. *For cross traverse of the cross slide.*

3. *For longitudinal traverse of the hexagon turret.*

GISHOLT

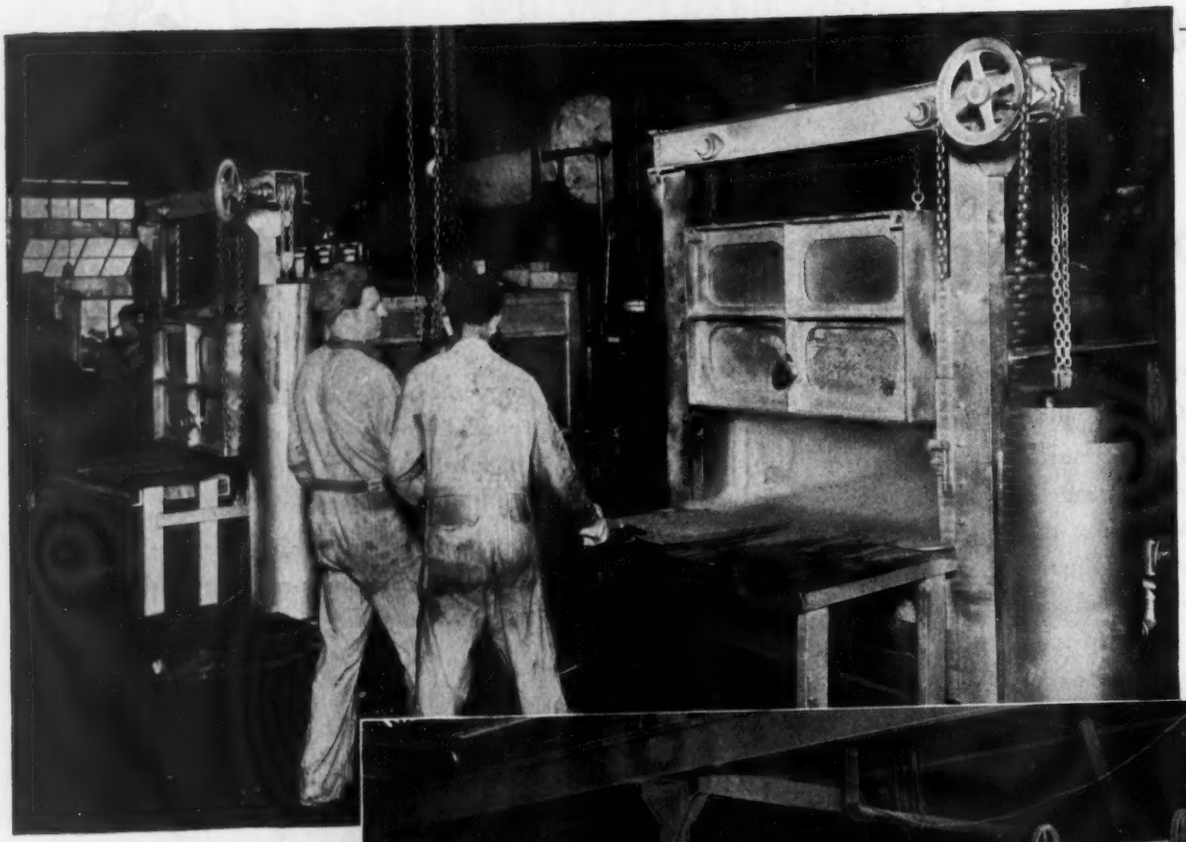
GISHOLT MACHINE COMPANY

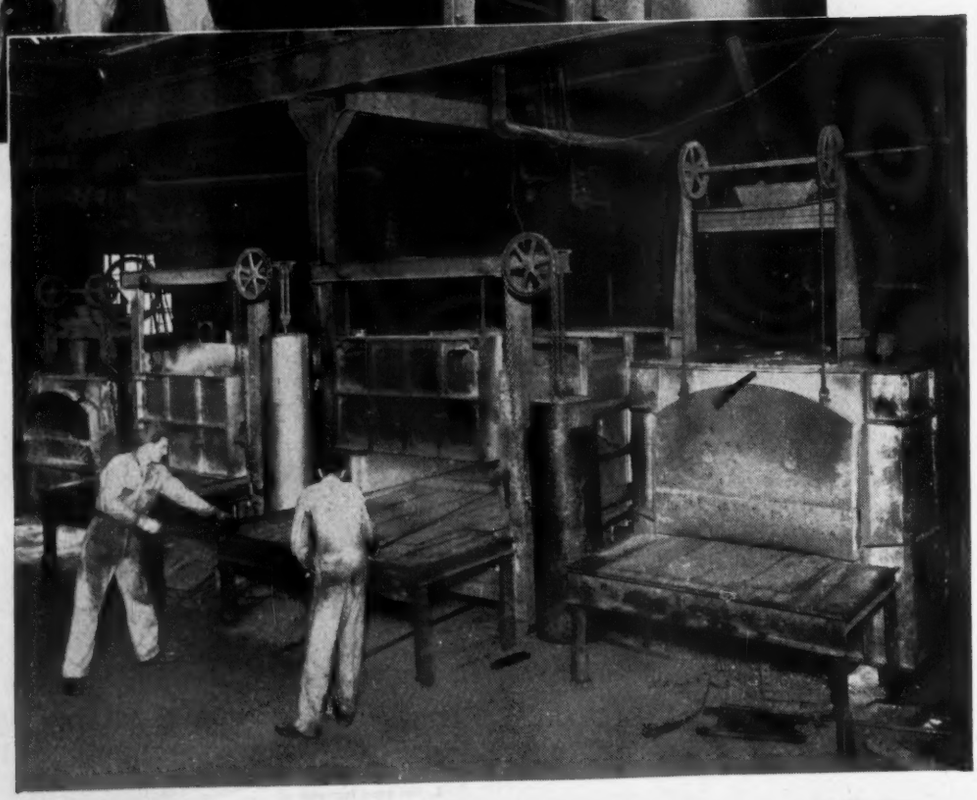
1217 East Washington Avenue • Madison 3, Wisconsin

Look Ahead... Keep Ahead... With Gisholt Improvements in Metal Turning

TURRET LATHES • AUTOMATIC LATHES • BALANCING MACHINES • SPECIAL MACHINES

"Our furnace efficiency





CARBORUNDUM
TRADE MARK

Super Refractories

increased in 4 ways—with —'CARBOFRAX' HEARTHS"

large commercial heat treater tells specifically why furnaces are now 100% "CARBOFRAX"-equipped.

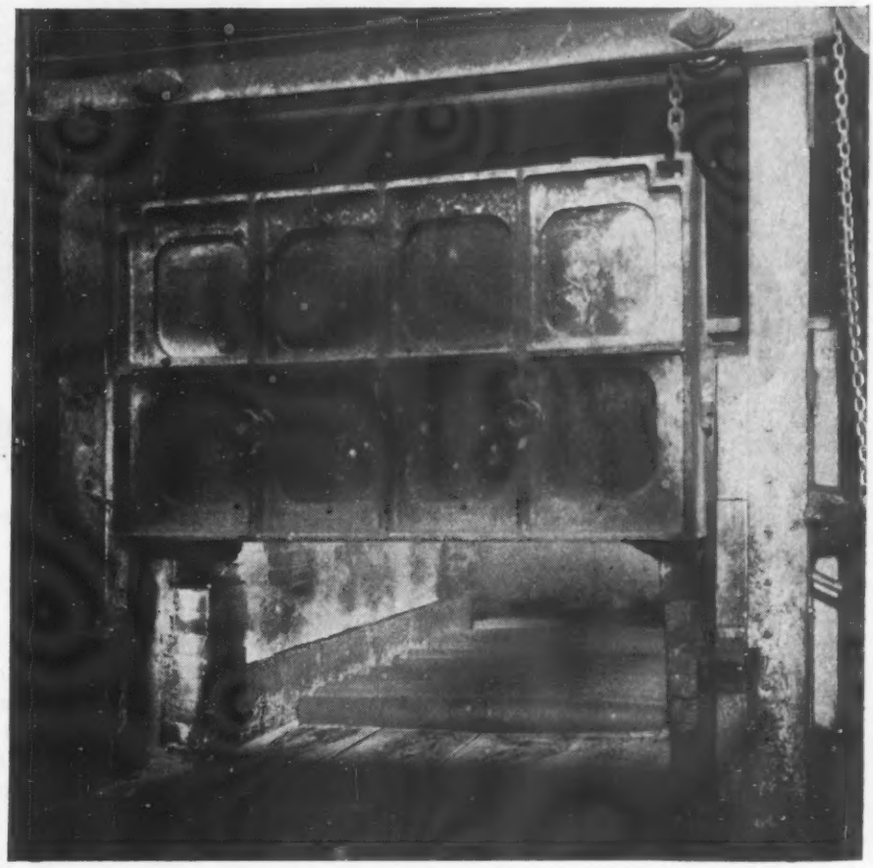
"A quicker comeback to operating temperatures after charging our furnaces has resulted from the use of 'CARBOFRAX' silicon carbide hearths. This has meant a very substantial increase in production for us.

"We find, too, that the temperatures are much more uniform even in our longest furnaces. Consequently, there are fewer rejected parts due to uneven heating.

"Alloy sheets are used to protect the hearths from the heavy work dropped on them. Even so, fireclay floors gave us only about six months' service as compared with an average life of two years from 'CARBOFRAX' hearths.

"When we replaced a fireclay hearth every six months it was also necessary to repair the combustion chamber lining. This lining now runs for over two years without repairs. With 'CARBOFRAX' hearths we can maintain the required temperature in the working chamber with a lower combustion chamber temperature.

"For these reasons we have standardized on 'CARBOFRAX' hearths and our furnaces are 100% so equipped."



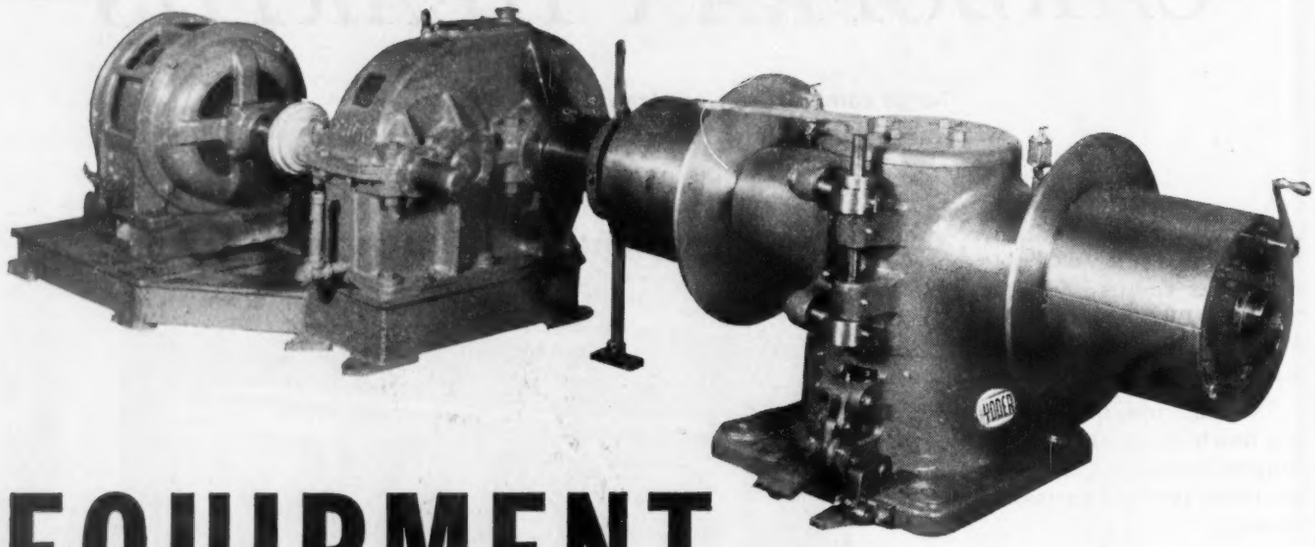
Faster furnace operation—increased production—lower fuel consumption—fewer rejects—all are made possible by the high thermal conductivity of "CARBOFRAX" hearths. And their resistance to elevated temperatures, spalling and cracking eliminates frequent shutdowns and reduces expense of refractories and maintenance.

Let the experience of this commercial heat treater whose furnaces must function at peak efficiency be your guide. Make your next hearth a "CARBOFRAX" hearth and enjoy these same advantages. Write today for more information. The Carborundum Company, Refractories Division, Dept. R1, Perth Amboy, N. J.

"CARBORUNDUM" and "CARBOFRAX" are registered trade marks of, and indicate manufacture by, The Carborundum Company

by CARBORUNDUM
TRADE MARK

COIL HANDLING

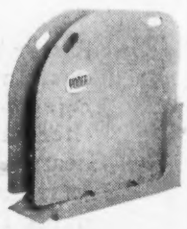


EQUIPMENT By *Yoder*

DEVELOPMENT of coiled strip in a constantly increasing variety of widths, guage and material has been an important factor in the advancement of high speed production in stamped, punched, drawn and roll-formed metal products. Yoder has specialized in the engineering and building of special handling equipment from the early days of strip making.

Today Yoder builds coil handling equipment as varied as industry's needs, from simple ball-bearing coil boxes to cone type uncoilers with drag generators and from simple stock reels to huge tension reels for steel mill use. The patented double-swivel type recoiler, shown above, handles single or multiple coils up to 6,000 pounds, is made so that coils can be unloaded from one side while the other is recoiling . . . The coil box at right is the simplest form made, ball bearing, easy to load, compact, suitable for serving a wide variety of strip-fed production machines. There are many other types.

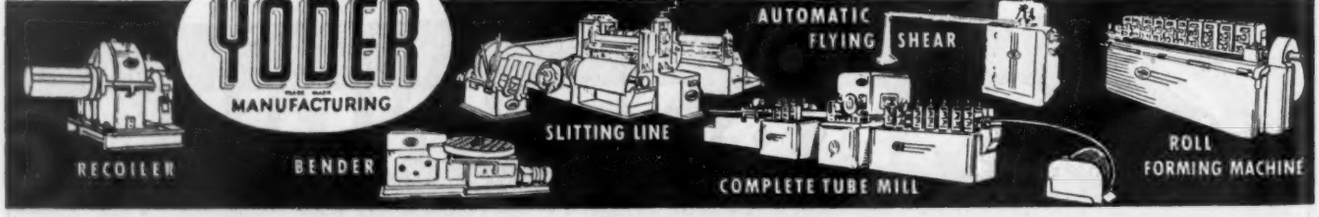
These machines may be had with Yoder pinch-roll feed stands, levellers, edge trimmers, or as integral parts of complete Yoder-built slitting or roll-forming lines. If your coil handling need is special, Yoder can engineer a unit for you, based upon the most complete experience in the industry.

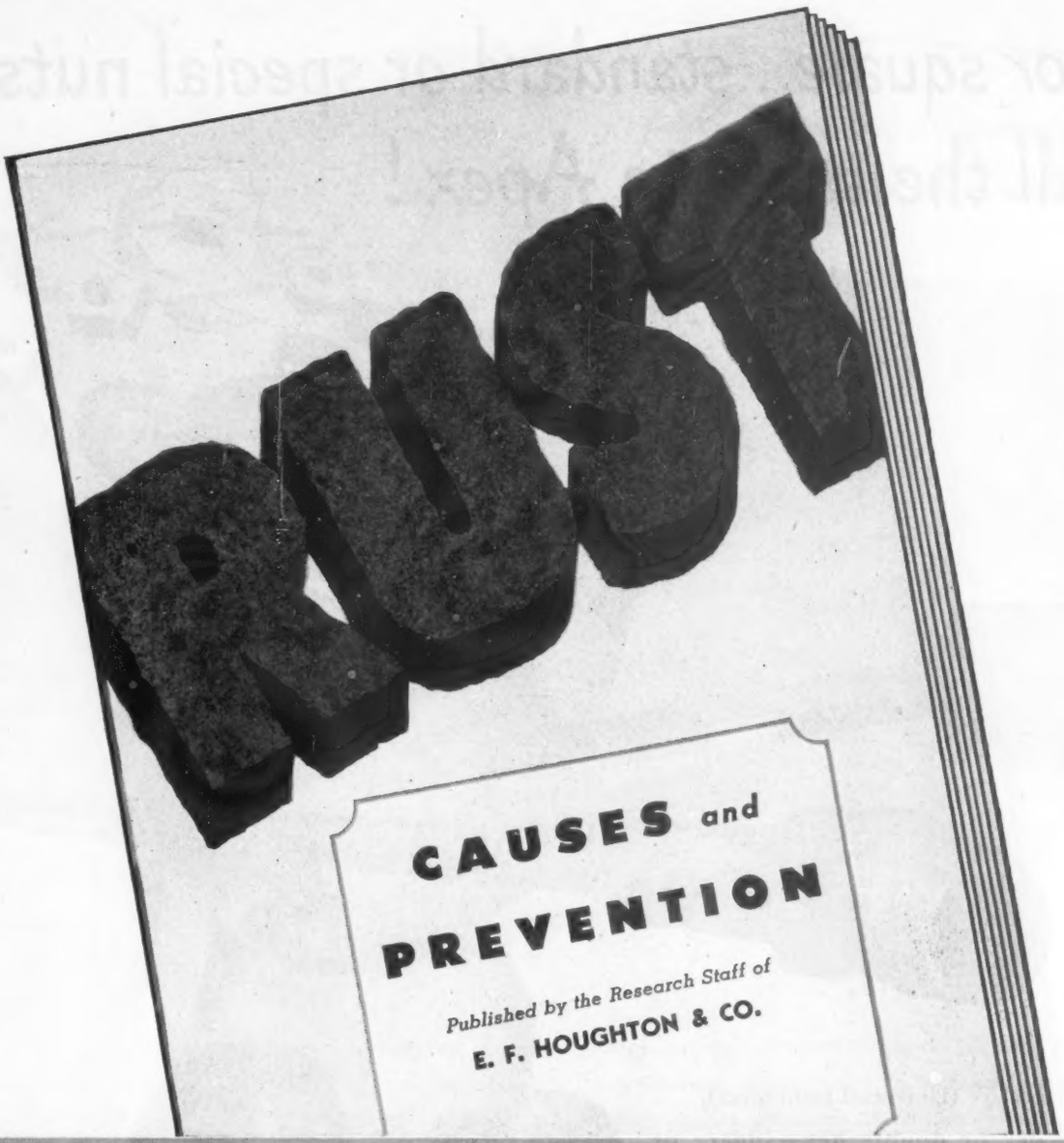


For engineering consultation or product information write to

THE YODER COMPANY
5502 Walworth Avenue, Cleveland 2, Ohio, U. S. A.

METAL • WORKING • PRODUCTION • MACHINERY
ENGINEERING
YODER
MANUFACTURING





NOW READY

The Most Complete Treatise on Corrosion Prevention Ever Published!

Seventy-two pages of real data on combating one of industry's most vital problems—CORROSION.

Compiled by a firm which has studied problems of rust through three wars, and which has supplied rust preventives in industry and government since 1867.

This book contains chapters on causes of rust, methods of cleaning, types of preventives, how to choose them, application, and protection of idle machinery. To get a free copy, return the coupon to E. F. HOUGHTON & CO.

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Please send me your new RUST book, free of charge.

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Hex or square...standard or special nuts... it's all the same to Apex!

SIZES—$\frac{5}{8}$" to $1\frac{1}{2}$" (Universal Joint Sizes).

SOCKETS—Hex or double hex—square or double square ($\frac{1}{4}$" AF and up).

SHANKS—To fit any type drive (electric, air or impact).

STYLE—With or without tension sleeve.

WORKING ANGLE—35% (No binding or breaking at maximum working angle).

HARDNESS to your own Rockwell specifications if you like.

We're tooled up for speed and flexibility. Apex also makes Universal Socket Adapters, Universal Joints, Phillips Bits and Screw Drivers, Production Tools for drilling, tapping, reaming and stud setting. *Write for Catalog 14.*

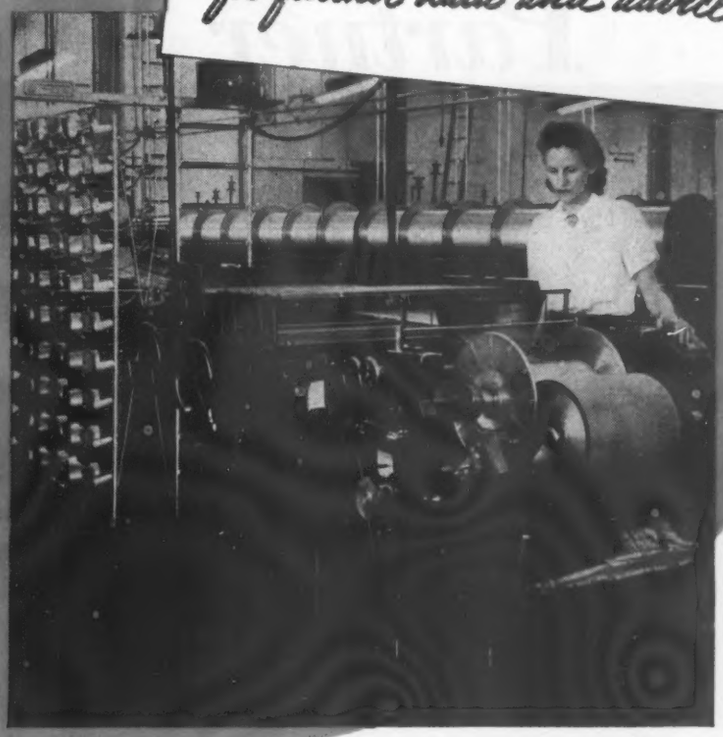
THE APEX MACHINE & TOOL COMPANY
DAYTON 2, OHIO

APEX

Socket Wrenches

Call American Magnesium for further data and advice

Magnesium Warp Beams crowd more work into an hour



Mazlo Magnesium warp beams are time-savers. Their extremely low weight speeds up the warping operation by permitting faster starts and stops. Their permanent dimensional accuracy reduces vibration and results in better warps. Because of the high strength and stiffness of Mazlo Magnesium warp beams, they are able to withstand the tremendous forces exerted by modern yarns.

A liftable idea!

Products going into the home have greater sales appeal if they're made lighter with magnesium. Magnesium in tools and equipment makes manual tasks less fatiguing. Lighter weight parts permit machines to be run at higher speeds. You get more production, costs are lower, products of higher quality.

May we help you incorporate magnesium in your products? For this help, write Aluminum Company of America, Sales Agent for Mazlo Magnesium products, 1721 Gulf Building, Pittsburgh 19, Pennsylvania.

MAGNESIUM MAZLO PRODUCTS

AMERICAN MAGNESIUM CORPORATION

SUBSIDIARY OF ALUMINUM COMPANY OF AMERICA

Silent Partner

of Performance

QUIET operation is a strong selling point for all types of household appliances. One easy way to eliminate noise is to install Johnson Bronze Sleeve Bearings in the motive unit. They are precision made products, guaranteed to deliver the utmost in performance for the longest period of time.

Manufacturers giving thought to their postwar product will do well to consult with Johnson Bronze now. Simply call in a Johnson Engineer. Permit him to review your applications. All of his recommendations will be based on facts, supported by more than thirty-five years exclusive bearing experience. There is a Johnson Engineer—as near as your phone.

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Victory
COMES FIRST
All our present production is for Armament

JOHNSON
SLEEVE BEARING HEADQUARTERS
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BRANCHES IN 18 INDUSTRIAL CENTERS

FERRY CAP ★ PIONEERING ★

The First Company to Produce Cold Upset Connecting Rod Bolts

Diesel Freight Locomotive for the Burlington Lines.

Subjected to terrific punishment . . . FERRY CAP connecting rod bolts are one of the most vital parts of this modern Diesel Locomotive

MADE of nickel alloy steel, threads rolled or cut, and finished to extremely close thread and body tolerances—body ground where specified—these bolts are noteworthy for their strength, toughness, and precision—in brief, for their performance.

Ferry Cap—recognized pioneers in cold upset connecting rod bolts for American industry—was the first company to produce nickel alloy steel cold upset connecting rod bolts—the first to turn out rolled thread connecting rod bolts 15% to 20% stronger than threaded by other known methods.

Millions of Ferry Cap connecting rod bolts were used daily before and during World War I, and are used daily in the leading diesel, marine, jeep, truck, and tractor motors of the country in World War II.

The same skilled workmen who produce these outstanding connecting rod bolts produce SHINYHEADS—America's Best Looking Cap Screw—SHINYTHREADS—America's Leading Aircraft Engine Studs—and other Ferry Cap products. We shall welcome the opportunity to discuss your requirements with you.

The FERRY CAP & SET SCREW Co.

2159 SCRANTON ROAD • • • • • CLEVELAND 13, OHIO

Pioneers and Recognized Specialists, Cold Upset Screw Products since 1907

CAP AND SET SCREWS • CONNECTING ROD BOLTS • MAIN BEARING BOLTS • SPRING BOLTS AND SHACKLE BOLTS • HARDENED AND GROUND BOLTS • SPECIAL ALLOY STEEL SCREWS • VALVE TAPPET ADJUSTING SCREWS • AIRCRAFT ENGINE STUDS • ALLOY STEEL AND COMMERCIAL STUDS • FERRY PATENTED ACORN NUTS

COPPER-OXIDE RECTIFIERS

Cut Plating Power Costs

To provide practically any d-c power required for plating or anodizing, G.E. offers copper-oxide plating rectifiers in three popular types:—The G.E. "300," the G.E. "500" and the G.E. "2000"—all designed for long life and maximum over-all operating efficiency.

Just as it is more economical to have individual motor drives for machines in a machine shop—so it is much more economical to have individual G-E rectifiers for individual tanks in the plating room.

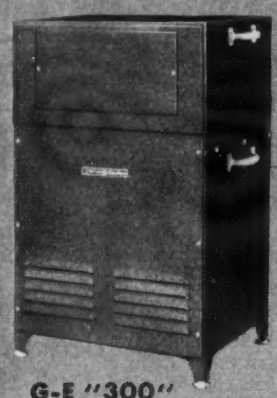
When one large power source is used to supply power to all tanks, the operation becomes costly during periods of light load when only a few tanks are operating. By consuming power only at the tanks which are being operated, G-E Copper-oxide Plating Rectifiers cut power costs.

Pay for additional d-c power that you may need by eliminating present waste. You can do this with G-E Copper-oxide Plating Rectifiers.

For more information write now to Section A253-90, Appliance and Merchandise Dept., General Electric Company, Bridgeport, Conn.

Hear the General Electric radio programs: "The G-E All Girl Orchestra" Sunday 10 P.M. EWT, NBC. "The World Today" news Monday through Friday 6:45 P.M. EWT, CBS. "The G-E House-Party" Monday through Friday 4:00 P.M. EWT, CBS.

BUY WAR BONDS AND KEEP THEM



G-E "300"
OUTPUT RATINGS
1. 6-volts, 300 amperes
2. 12-volts, 150 amperes

G-E "500"
OUTPUT RATINGS
1. 6-volts, 500 amperes
2. 12-volts, 250 amperes

G-E "2000"
OUTPUT RATINGS
1. 6-volts, 2000 amperes or 12-volts, 1000 amperes
2. 24-volts, 500 amperes or 48-volts, 250 amperes

GENERAL ELECTRIC

THE WIRE OF A THOUSAND USES

The versatility of Continental wire is apparent when you look at the illustrations above. There is not only a big difference in the size of the wire in the match book and the pin in the door hinge, but there is a big difference in the temper, analysis, and finish. Continental wire for each of these applications is made especially to meet the individual requirements.

Continental specializes in producing wire in a vast variety of shapes, tempers, analyses, and coatings to fit the particular specifications of hundreds of products. You are invited to take advantage of this service. Write or wire today for complete information.

CONTINENTAL
STEEL CORPORATION
GENERAL OFFICES • KOKOMO, INDIANA

PRODUCERS OF: MANUFACTURER'S WIRE: Bright, Annealed, Galvanized, Coppered, Tinned, Liquor Finished, Lead Coated, Special wire, etc. Also Chain Link Fence, Nails, etc. STEEL SHEETS: Black, Galvanized, Hot Rolled Annealed, Hot Rolled Pickled, Long Terne, Copperior, Lead-Sealed, Galvannealed, Super-Metal, etc.

THE SUPERIOR SHEET STEEL COMPANY, *DIVISION* • CANTON, OHIO

An Unusual Stamping Job in Stainless Steel

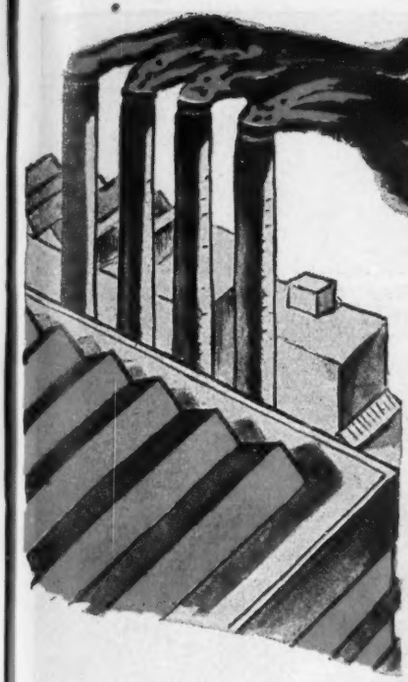
For sanitary reasons a certain prominent manufacturing company wanted these parts for meat grinders made in single-piece stampings. But, because it is quite a trick in stainless steel to push through a neck off center like this and curl the edge, the only solution that was offered was a two-piece welded job—until the company put the problem up to Presteel.

We offer the successful result as another indication of our flexibility. Extraordinary tooling experience and fast, accurate presses will permit Presteel, when the time comes, to turn to civilian production immediately—without the problems of equipment reconversion. Meanwhile Presteel engineers will be glad to help you with your new design or redesign planning. Write to

WORCESTER PRESSED STEEL CO.

502 Barber Avenue, Worcester 6, Mass.

ALLOY STEELS AND OTHER METALS COLD FASHIONED SINCE 1883



DON'T LET PRE-WAR METHODS KILL POST-WAR PROSPERITY!

The war years have proven to American Industry that the light machine tool has an important place in Production. Walker-Turner machine tools have demonstrated their ruggedness under most exacting conditions.

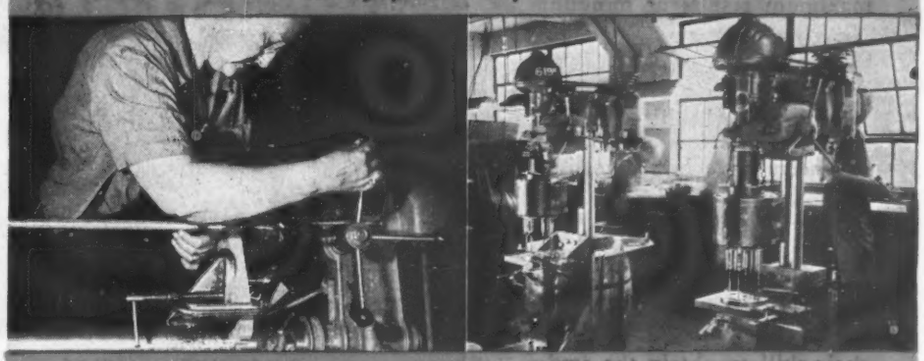
Don't let pre-war operating methods affect your post-war competitive position. The versatility of Walker-Turner machine tools will ensure production equal to—and, in many cases, better than—heavier and more expensive equipment.

WALKER-TURNER COMPANY, Inc.
Plainfield New Jersey

HERE'S HOW WALKER-TURNER MACHINE-TOOLS CUT COSTS!

260-5200 R.P.M. 60-5300 S.F.M. 160-8300 R.P.M.

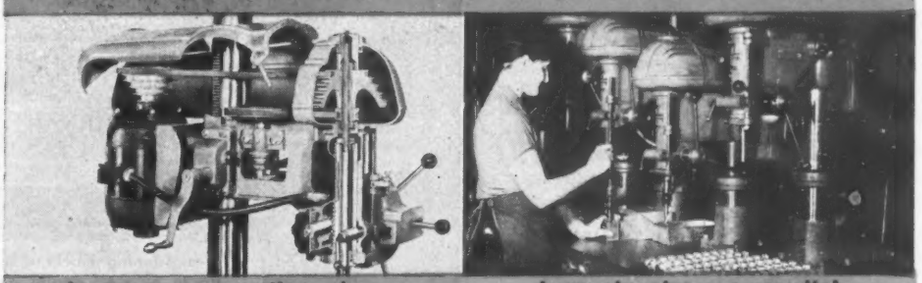
Wide range of operating speeds enables you to select the optimum cutting speed for any material.



Walker-Turner flexibility saves time and cuts costs in special tooling set-ups.

Set up horizontally, this Walker-Turner 15" Drill Press flares the ends of tubing.

This Walker-Turner 20" Drill Press drills five holes and reams two holes in one operation.



Low power consumption reduces operating costs.

This motor on a Walker-Turner 20" Drill Press provides speeds for drilling up to 3/4" in steel, 1" in cast iron.

Low price decreases capital investment.

This Walker-Turner 4-spindle 20" Drill Press costs no more than a single heavy unit, yet has several times its production capacity.

walker-Turner COMPANY, Inc. PLAINFIELD, N.J. U.S.A.

MACHINE TOOLS

DRILL PRESSES — HAND AND POWER FEED • RADIAL DRILLS
METAL-CUTTING BAND SAWS • POLISHING LATHES • FLEXIBLE SHAFT MACHINES
RADIAL CUT-OFF MACHINES FOR METAL • MOTORS • BELT & DISC SURFACERS

To Speed Up YOUR STRAIGHTENING JOBS

Levelling heavy steel plates, or straightening large structural shapes can be costly and time-consuming, unless the machines you use are efficient. Perhaps one of these Birdsboro straightening machines will meet your requirements. Or perhaps, you will need a specially-designed straightening machine to secure maximum results at minimum cost.

Birdsboro steel mill equipment engineers have had diversified experience in designing, straightening and levelling machines. Take advantage of their skill to obtain the equipment you need to do your straightening jobs best.

BUY WAR BONDS

BIRDSBORO STEEL FOUNDRY AND MACHINE COMPANY

BIRDSBORO, PENNA.

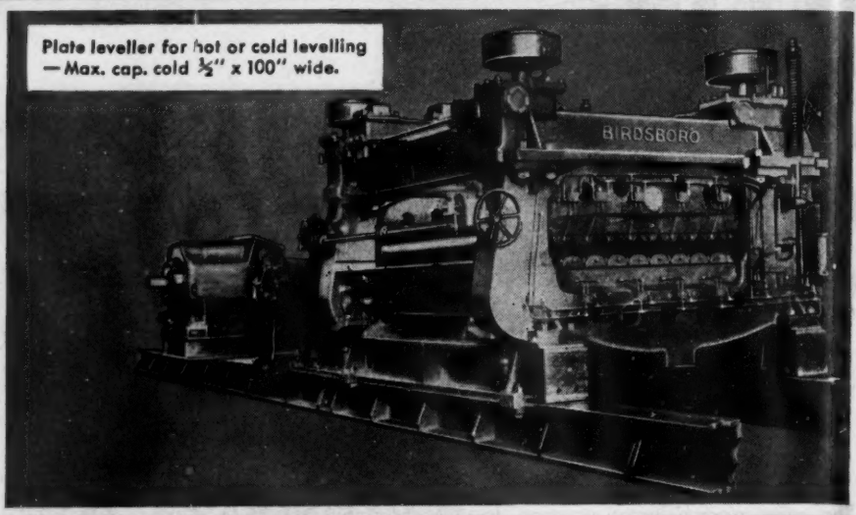
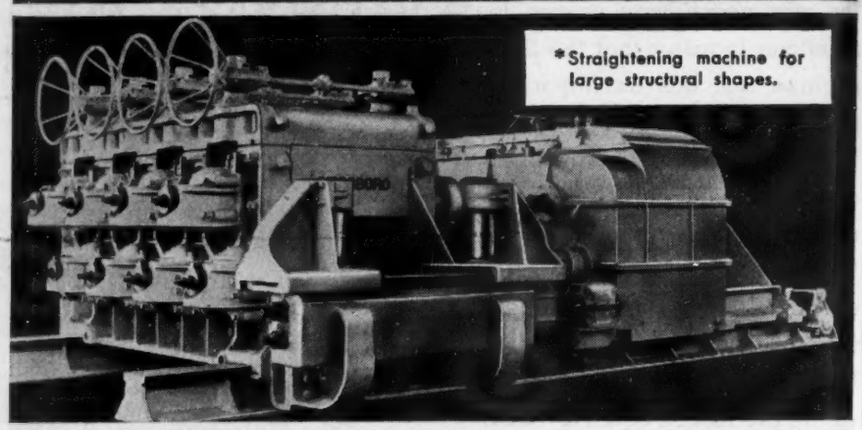
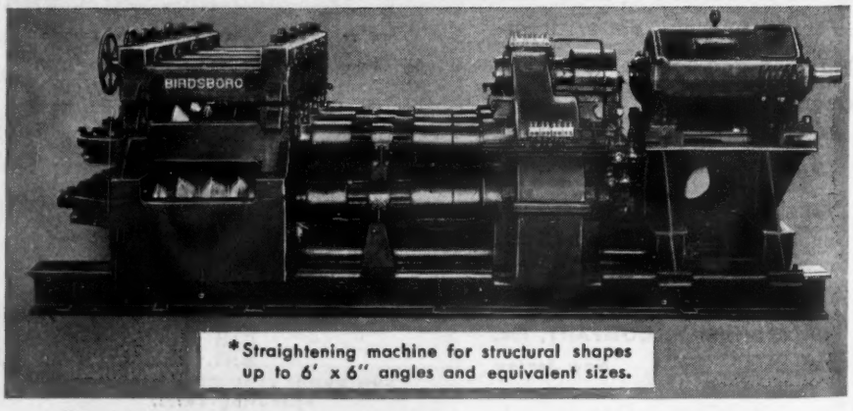


Plate leveller for hot or cold levelling — Max. cap. cold ½" x 100" wide.



*Straightening machine for large structural shapes.

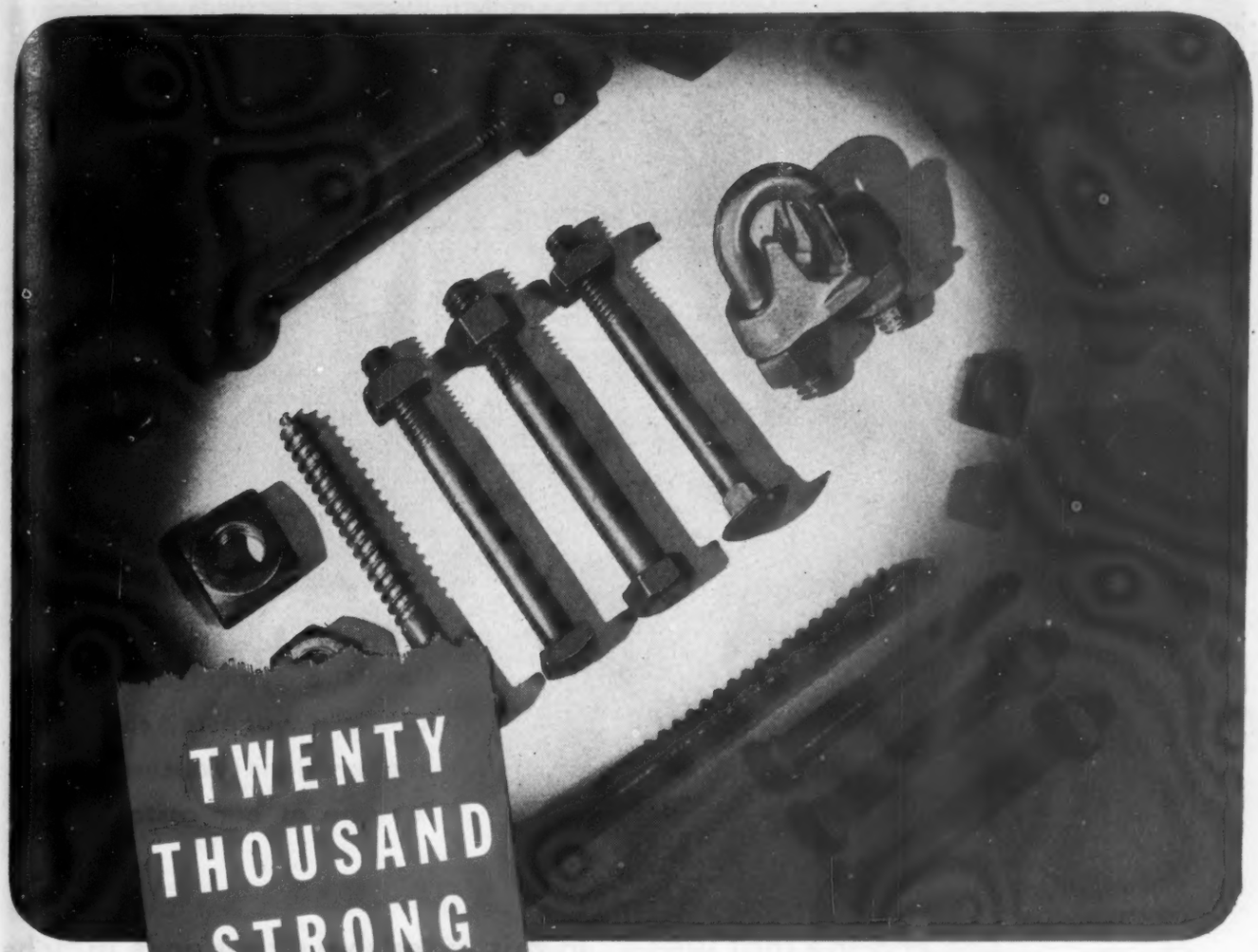


*Straightening machine for structural shapes up to 6" x 6" angles and equivalent sizes.

*Straightening machines are equipped with our "patented" end roll adjustment.

BIRDSBORO

STEEL MILL EQUIPMENT



★ The Republic Upson Line has 20,000 types and sizes of Bolts and Nuts to serve you

Counting from one to twenty thousand would take hours—but that would be one way to get a better idea of the full extent of the Republic Upson Line of headed and threaded products. There are sizes and types there to fill *all* your fastening needs.

These Republic Upson products are not ordinary bolts and nuts either. They have a 90-year-old reputation for good service. Their high, uniform quality is controlled by *one* organization from the *processing of the ore to the finished product.*

Republic Upson Quality means *uniform accuracy to size* in the heads, shanks, threads and nuts—*uniform toughness* inside and out. Heads and nuts are sharp-cornered, straight-sided, fit wrenches perfectly, prevent slippage. Threads are strong, clean cut, exact for spacing and depth, and take heavy wrenching.

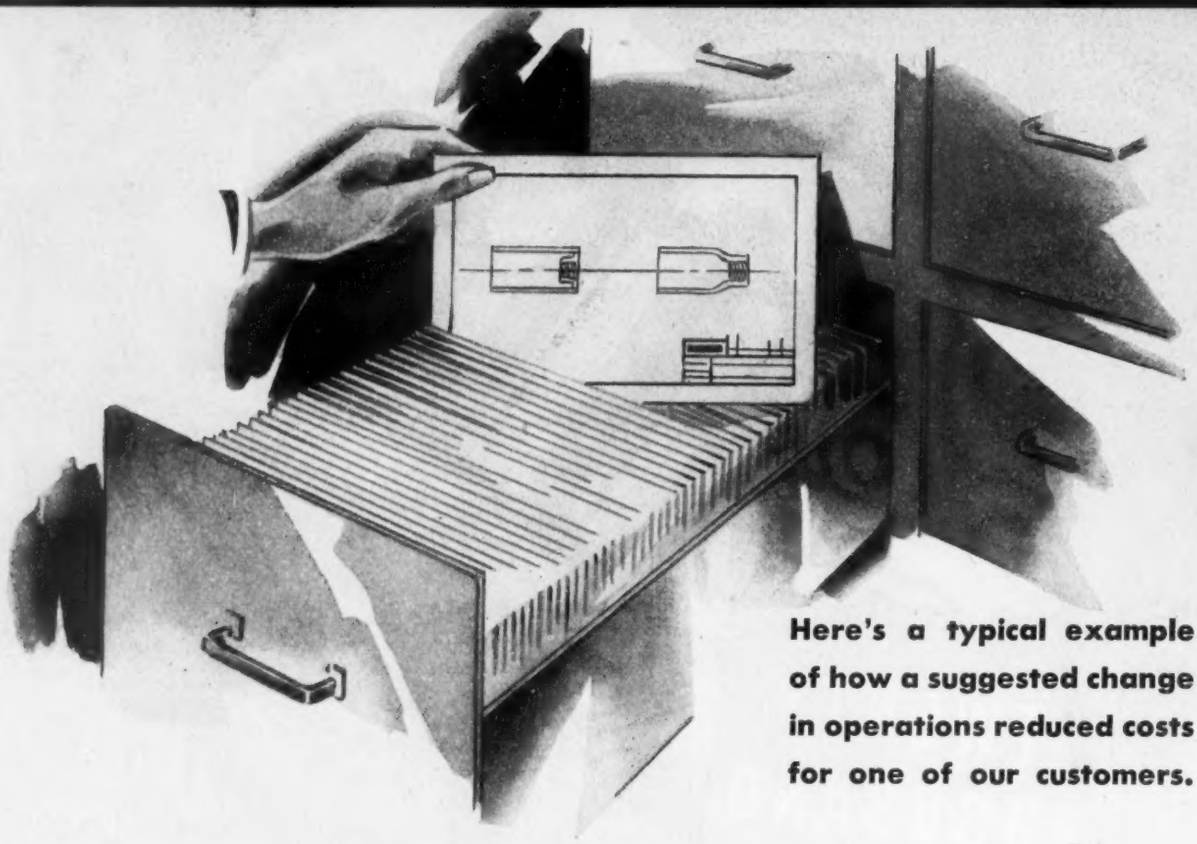
For better bolt and nut service in the postwar future, standardize on the specification—Republic Upson.

REPUBLIC STEEL CORPORATION
BOLT AND NUT DIVISION • CLEVELAND 13, OHIO
Export Department: Chrysler Bldg., New York 17, N. Y.

REPUBLIC *Upson Quality* BOLTS AND NUTS

Other Republic products include Pipe, Sheets, Tubing, Hot Rolled and Cold Drawn Bars—Carbon, Alloy and Enduro Stainless Steels

OUT OF THE FILES OF WOLVERINE'S CUSTOMERS ENGINEERING SERVICE



Here's a typical example of how a suggested change in operations reduced costs for one of our customers.

The change that was made in a seamless copper tube part effected the elimination of a plug fitting which in turn eliminated a brazing operation. The combination, evolved into a simplified design, brought about surprising but welcome savings to the customer.

This illustrates one case taken from the vast fund of information on file here at Wolverine—representing many years of varied experience.

In this extensive experience may be the answer to your particular problem. We invite you to make use of our Customers Engineering Service at any time—whether you are seeking a solution to a present problem or to one that is anticipated in a future plan.

BUY MORE WAR BONDS

WOLVERINE
TUBE DIVISION

CALUMET & HECLA CONSOLIDATED COPPER COMPANY

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Hydraulics—

COMPLETELY ADAPTABLE TO ANY MOTION DESIRED

"Hy-Mac" Hydraulic Power Units can be applied to drilling, grinding, milling, boring, piercing, riveting, broaching, pressing . . . just determine the functions of the machines that are to be hydraulically operated—and our engineers will recommend a Power Unit and a layout of circuits to best do the job . . . For feed and traverse of multiple or single tools . . . for indexing and locating . . . for clamping, etc., all or any of the movements and in any combination, can be adapted to HYDRAULICS . . . Any designer or builder of machines can accommodate their specific design, either partially or completely to "HY-MAC" HYDRAULICS . . . and our modern plant, together with a comprehensive engineering department is completely competent to handle all of the technical planning, designing, and detailing in connection with building of hydraulic and specific-purpose machinery . . . Our engineers will be glad to make recommendation and preliminary proposal without obligation.

8444-Unit for actuating and controlling a simple feed circuit which incorporates rapid traverse, adjustable feed and rapid return of a single slide —primarily for drill press type of operation but can also be used for the control and actuation of a press or any machine where only one slide is to be controlled.

HYDRAULIC MACHINERY, INC.
12825 FORD ROAD • DEARBORN, MICHIGAN

HYDRAULIC MACHINERY

Deep-Drawn Shapes

can be drawn better

on Firthaloy dies

(THE STANDARD CARBIDE)

Many leading manufacturers are using FIRTHALOY Dies to draw and form a wide variety of shapes and sizes.

Such forward-looking manufacturers have found that FIRTHALOY'S resistance to pressure and abrasion makes possible these economies:

(1) Long production runs—often from 100% to 1000% increase;

(2) Reduced number of passes;

(3) Better finish, and uniformity on size;

(4) Lowered operating costs.

Quotations on Request.

Please furnish the following information when requesting quotation:

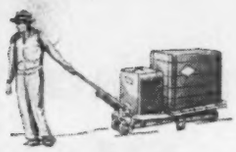
(a) Type and thickness of metal to be drawn;
(b) Sketch of die, if possible;
(c) Sample of product, before and after operation;
(d) Type of press; (e) Maximum permissible overall die size.

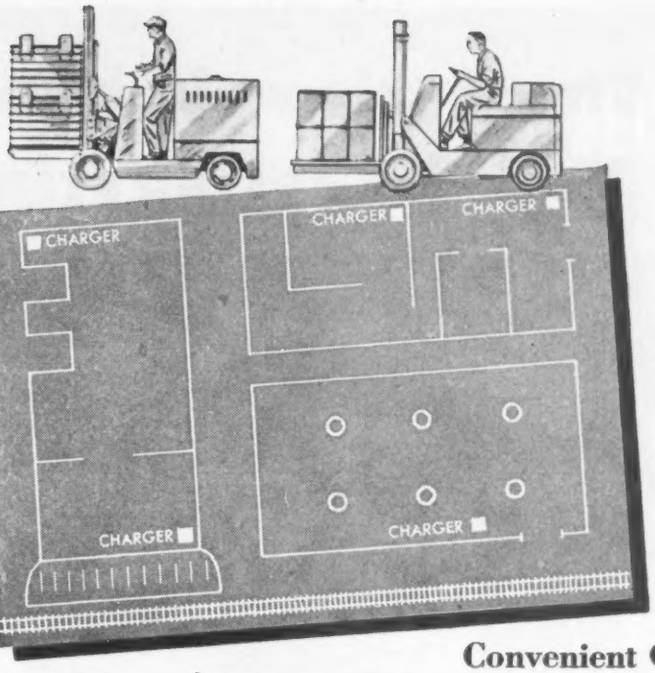
ARMY E NAVY

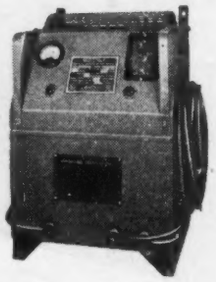
Firth-Sterling

STEEL COMPANY

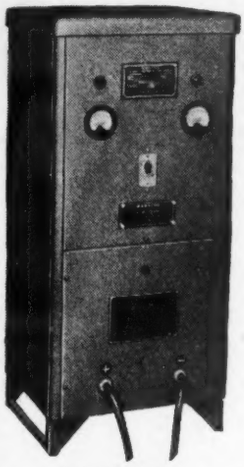
OFFICES: McKEESPORT, PA. NEW YORK HARTFORD PHILADELPHIA PITTSBURGH CLEVELAND DAYTON DETROIT CHICAGO LOS ANGELES







TYPE 50TC
AND TYPE 100TC
115 OR 230 VOLTS
SINGLE PHASE AC



TYPE 125TC
220 VOLTS 3 PHASE AC

TYPE 125TCA
440 VOLTS 3 PHASE AC

TYPE 175TC
220 VOLTS 3 PHASE AC

TYPE 175TCA
440 VOLTS 3 PHASE AC

Convenient Charging for
Lead or Nickel-Iron Industrial Truck Batteries with

MALLORY Battery Chargers

Many users of industrial electric trucks have found it both economical and convenient to install several Mallory Automatic Battery Chargers, located at focal points of truck operation.

No special bases or floor mountings are required. Thus a Mallory Battery Charger may be placed in the plant wherever operating conditions demand. Long runs back to a central charging station are avoided. Time is saved, as well as battery power. "Tow-ins" can be eliminated.

Operation of Mallory Battery Chargers is automatic. The truck operator merely plugs the charger into the battery, and turns the control knob. No further adjustments or readings are necessary. An electric cut-off disconnects both AC and DC circuits automatically when charging is completed.

Mallory Battery Chargers speedily charge either lead or nickel-iron batteries. Long life and silent operation are assured by rectification with Mallory magnesium-copper sulphide dry disc rectifiers. With no moving parts, these rugged units give years of trouble-free service.

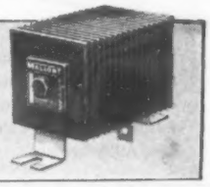
For complete information, see your nearest Mallory Distributor. Or write us.

P. R. MALLORY & CO., Inc.,
INDIANAPOLIS 6, INDIANA

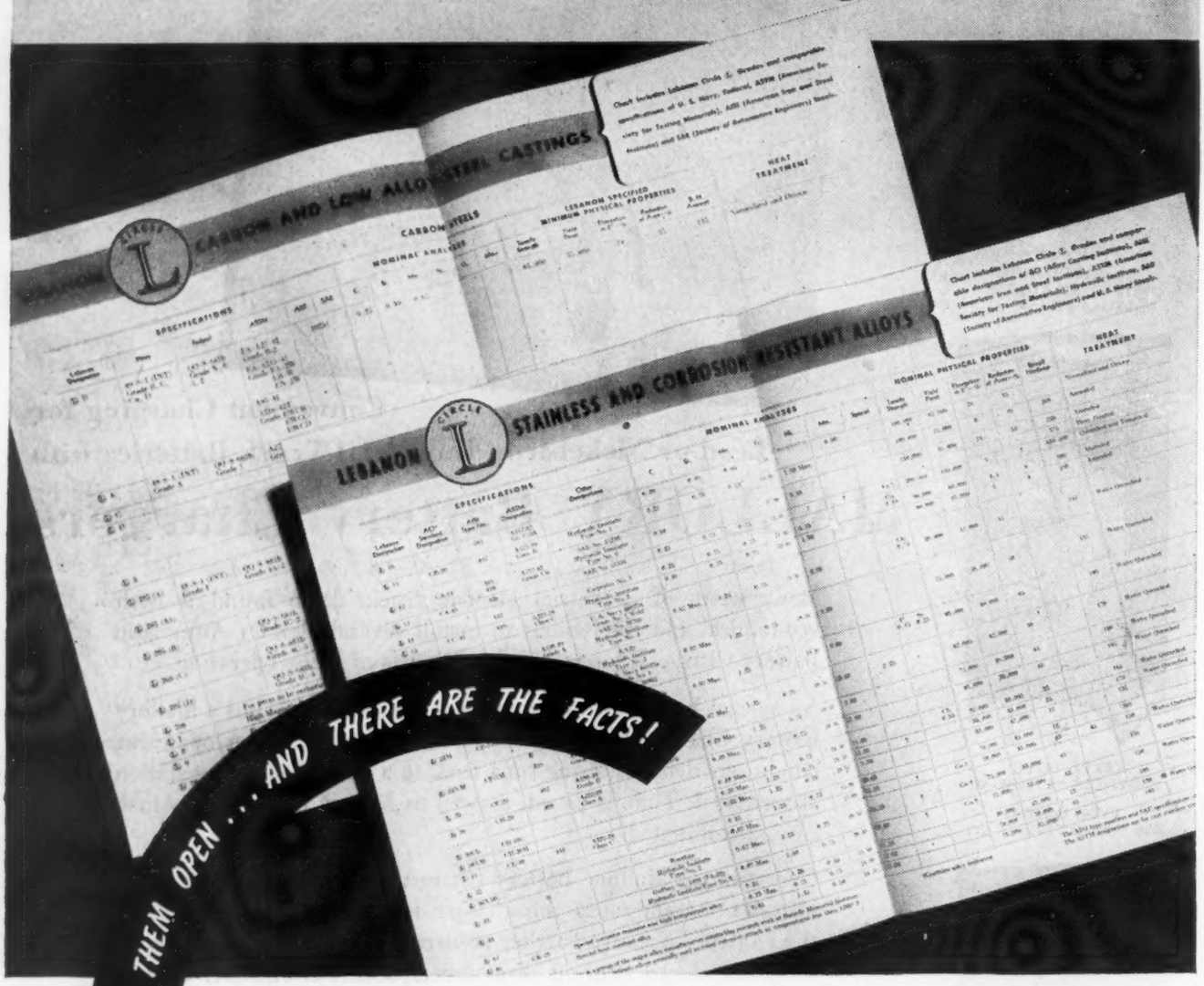
**Rectostarter is the registered trademark of P. R. Mallory & Co., Inc., for rectifier units for use in starting internal combustion engines.*

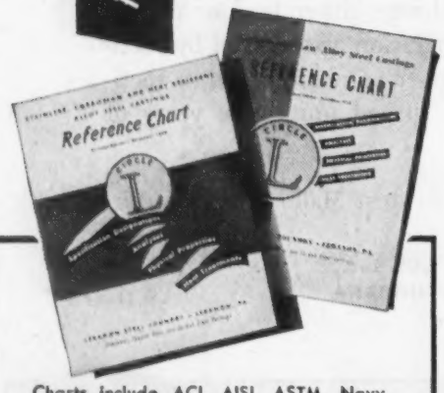
P. R. MALLORY & CO Inc
MALLORY RECTIFIERS

MAGNESIUM COPPER SULPHIDE RECTIFIERS—
STATIONARY AND PORTABLE D. C. POWER SUPPLIES—
BATTERY CHARGERS AND AVIATION RECTOSTARTERS*



Add These New Lebanon Charts To Your Steel Castings File!


LEBANON CIRCLE L CARBON AND LOW ALLOY STEEL CASTINGS
LEBANON CIRCLE L STAINLESS AND CORROSION RESISTANT ALLOYS
FLIP THEM OPEN . . . AND THERE ARE THE FACTS!



Charts include ACI, AISI, ASTM, Navy, Federal, Hydraulic Institute and SAE designations for 22 Lebanon Circle (L) Stainless and Corrosion Resistant Alloy Steels, 5 Heat Resistant Alloy Steels and 15 Carbon and Low Alloy Steels.

WHAT'S more valuable than up-to-date information when you must make decisions at emergency or reconversion speed? Bring your steel castings file up-to-the-minute with copies of these revised charts on Lebanon Circle (L) Stainless, Corrosion and Heat Resistant Alloys and on Lebanon Circle (L) Carbon and Low Alloys.

These charts are just the right size for convenient use. Simply flip them open and there, on two facing pages, are all the facts. At a glance, you see comparable specification designations (including wrought and cast materials), analyses, physical properties and heat treatment.

Executives, engineers and metallurgists may obtain copies of these easy-to-use, easy-to-file reference charts, without charge, by writing to Lebanon Steel Foundry.

LEBANON STEEL FOUNDRY **LEBANON, PENNA.**

ORIGINAL AMERICAN LICENSEE GEORGE FISCHER (SWISS CHAMOTTE) METHOD

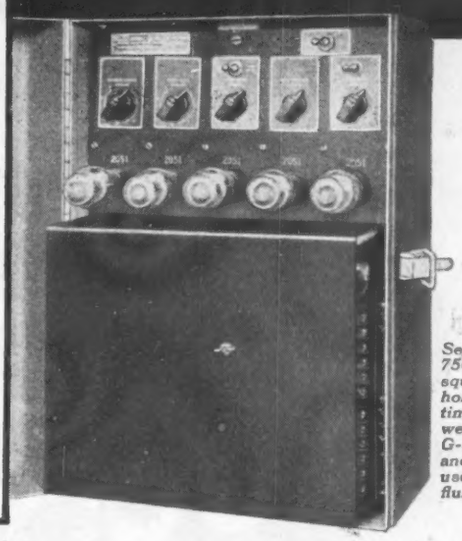
Lebanon ALLOY and STEEL *Castings*

FOR GOOD, FAST RESISTANCE WELDING
. . . Even with NEW Operators

Use electronic sequence and weld timers to automatically time the complete welding sequence.

Automatic Timing Means:

1. **Operator is relieved of timing operations**
2. **Increased production**
3. **More consistent welds—fewer rejects**



Sequence timer (CR-7503-F125-G2) having squeeze-, cool-, weld-, hold-, and off-period timers for pulsation welding. The entire G-E line of sequence and weld timers is for use on either air- or fluid-operated welders

7 G-E FEATURES

• **Electronic**—Consistent timing is provided, the timing intervals being determined by electronic circuits.

Less maintenance required—these timers have few moving parts.

• **Each period independently adjustable**—The setting on one dial will not affect the setting on another.

• **Timing dials graduated in cycles**—Dials are located so operator can see all settings easily.

• **Reliable thyratron tubes control timing**—These tubes are of standard type, and are also conveniently located.

• **Nonbeat* with repeat or nonrepeat feature**—A complete sequence is carried out even when the foot (initiating) switch is momentarily closed. This feature reduces the possibility of the operator opening the timing circuit before the weld is completed.

*The few which do not have nonbeat feature have been designed for specific applications.

• **Dead-front panel provides greater safety**—All live parts are covered by an easily removed shield which can be taken off quickly for routine inspection and maintenance.

• **Correlated Design**—General Electric electronic resistance-welding controls are designed to operate in conjunction with these timers. However, the timers may also be used with other manufacturers' controls. Complete interconnection diagrams to assist in installation and maintenance are furnished with combinations of standard electronic controls.

These timers are designed for wall mounting, and can be located on or near the welding machine.

We have a complete line of these weld and sequence timers that are designed to meet your requirements.

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For our bulletin which will help you select exactly the proper timer for your machine.

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Please send a copy of your bulletin, "Electronic Sequence and Weld Timers" (GEA-3318).

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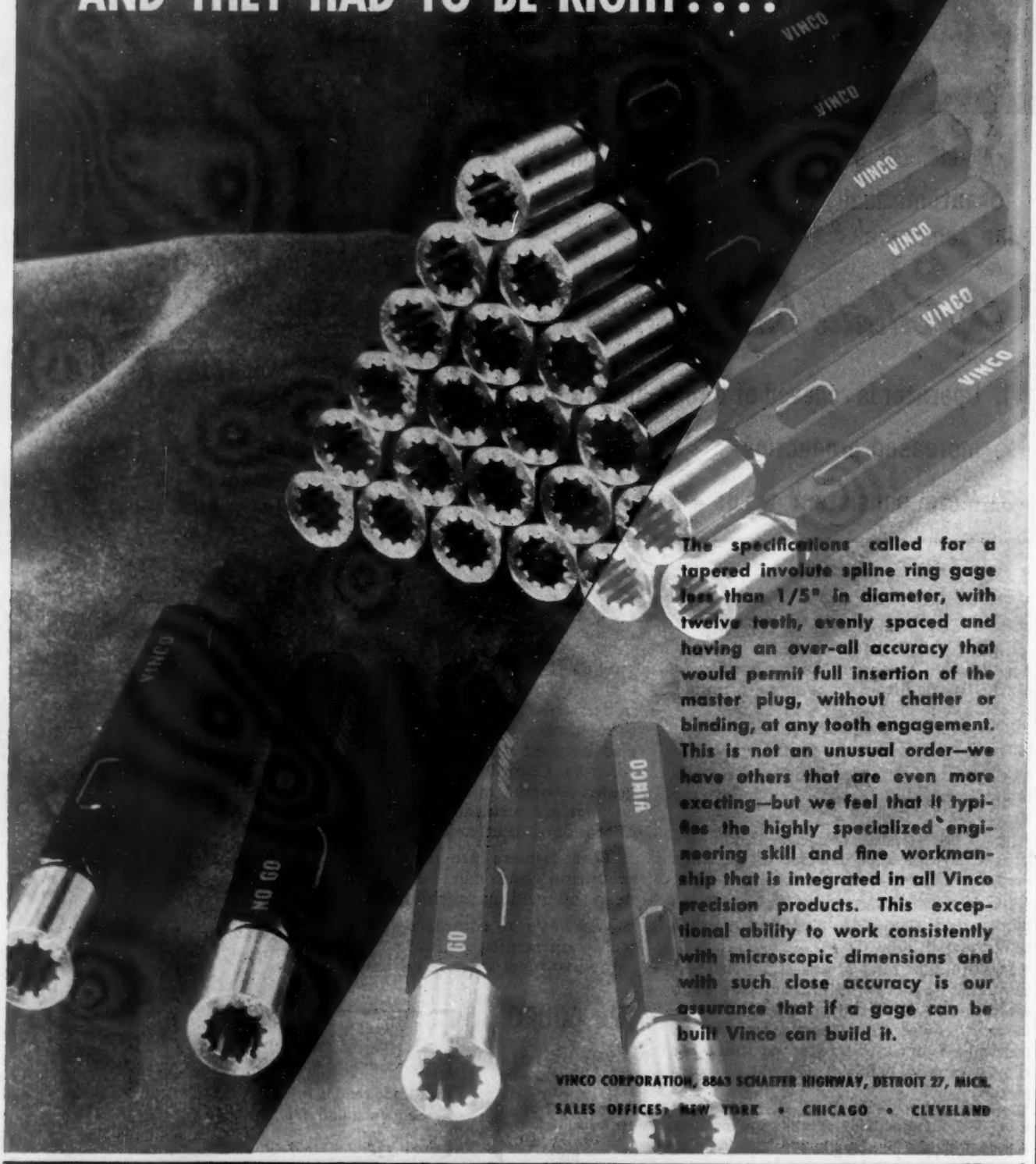
GENERAL ELECTRIC

THESE GAGES WERE NEEDED IN QUANTITY— AND THEY HAD TO BE RIGHT!!!!



The specifications called for a tapered involute spline ring gage less than 1/5" in diameter, with twelve teeth, evenly spaced and having an over-all accuracy that would permit full insertion of the master plug, without chatter or binding, at any tooth engagement. This is not an unusual order—we have others that are even more exacting—but we feel that it typifies the highly specialized engineering skill and fine workmanship that is integrated in all Vinco precision products. This exceptional ability to work consistently with microscopic dimensions and with such close accuracy is our assurance that if a gage can be built Vinco can build it.

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Advertisement

FEBRUARY, 1945

COPPER ALLOY BULLETIN

REPORTING NEWS AND TECHNICAL DEVELOPMENTS OF COPPER AND COPPER-BASE ALLOYS

Prepared Each Month by the Bridgeport Brass Co. "Bridgeport" *Headquarters for BRASS, BRONZE and COPPER*

Brass and Copper for Deep Drawing, Spinning and Stamping

Wide Range of Physical Properties

Space does not permit a complete discussion of the many advantages of brass for drawing, spinning and stamping. Through long usage its fine appearance, wearability, non-rusting properties and lasting satisfaction are taken for granted by users of brass products. Only when it is necessary to use substitute materials are the fine characteristics of brass most fully appreciated. The manufacturer, on the other hand, thinks of brass in terms of easy workability, less wear on tools, economy when a number of fabrication operations are involved, and ease of attractive, durable plating and finishing.

Manufacturers striving for lower costs through greater efficiency seek materials which are of correct composition, gauge, temper, surface, coil length, etc. Laboratory skill, modern manufacturing methods and close cooperation can work wonders by increasing quality and cutting waste, labor and materials through reduction of unnecessary scrap.

The physical and mechanical properties of six alloys, ranging from high brass to gilding metal, together with standard grades of copper, are listed herewith. Included are recent specifications and brief descriptions of their most popular uses. Keep this bulletin for future reference. We shall be glad to supply extra copies as long as they are available.

High Brass (approximately 66% copper, balance zinc) color, bright yellow. Most widely used alloy of the brasses. Suitable for a great variety of drawing, forming, spinning, stamping and etching operations. Has many applications in the manufacture of building hardware, electrical sockets and other parts, auto lamp reflectors and accessories, novelties, gift items, etc.

70-30 Brass (approximately 70% copper, balance zinc) color, bright yellow. Known as cartridge brass. Because of greater strength and higher ductility than high brass it is universally used for the manufacture of artillery cartridge cases and small arms ammunition; for deep drawn and spun parts such as musical instruments; for the manufacture of eyelet machine items, and products made by progressive machine operations. 70-30 brass is also used for making parts requiring extra deep draws with fewer intermediate anneals than high brass.

Low Brass (approximately 77% to 82% copper, balance zinc) color, light golden. Very ductile. For making flexible metallic hose, metal bellows, clock dials, medallions, etc.

Red Brass sometimes known as "rich low" (approximately 82% to 87% copper, balance zinc) color, deep golden. Very ductile. Widely used for water pipe and auto radiator cores, because of its corrosion resistance; vanity cases and inexpensive jewelry because its color resembles 14K gold. Also used for weather strip, fire extinguishers, because of its resistance to weathering and season cracking.

Commercial Bronze (approximately 87% to 94% copper, balance zinc), rich, warm bronze color. Has great ductility. Resists weathering, corrosion and season cracking. For outdoor electric light fixtures, hardware, costume jewelry, grilles, screen cloth, primer caps, screw shells.

Gilding Metal (approximately 94% copper and over, balance zinc) color, light copper. Great ductility and resistance to season cracking and corrosion. Used for enamelled jewelry, escutcheons, nameplates, bullet jackets.

Copper for Fabrication

Can be worked either hot or cold. When cold worked does not harden as rapidly

(*Continued on page 2, column 2*)

BRASS AND COPPER STRIP—*For Drawing, Spinning and Stamping*

		High Brass	70-30 Brass	Low Brass	Red Brass	Com. Bronze	Gilding Metal	Copper Elec. Tough Pitch
ANALYSIS								
Copper %		66.0	70.0	80.0	85.0	90.0	95.0	99.92
Lead %								
Tin %								
Zinc %		34.0	30.0	20.0	15.0	10.0	5.0	
Oxygen								0.04
MECHANICAL PROPERTIES								
Ten. Strength psi	Hard*	74,000	76,000	74,000	70,000	61,000	56,000	50,000
	Soft	47,000	47,000	44,000	40,000	38,000	35,000	34,000
Yld. Strength psi (@½ % extens. under load)	Hard*	60,000	63,000	59,000	57,000	54,000	50,000	45,000
	Soft	15,000	15,000	14,000	12,000	12,000	11,000	11,000
Elongation % in 2"	Hard*	8	8	7	5	5	5	6
	Soft	62	62	50	47	45	45	45
Rockwell Hardness	Hard*	B80	B82	B82	B77	B70	B64	B50
	Soft	F64	F64	F61	F60	F57	F52	F45
PHYSICAL CONSTANTS								
Melting Pt. (Liq)°F		1710	1750	1830	1880	1910	1950	1981
Density, lbs./cu. in.		0.306	0.308	0.313	0.316	.318	.320	.321-.323
Coeff. Therm. Exp. per °F from 77°F to 572°F x10^{-6}		11.3	11.1	10.6	10.4	10.2	10.0	9.8
Thermal Conduct. Btu/sq ft/ft/hr/°F @ 68°F		67	70	81	92	109	135	226 192 (a) 228 (b)
Elec. Cond. % IACS @ 68°F Soft		27	28	32	37	44	56	101 85 (a) 102 (b)
Mod. of Elas. (Tension) psi.		15,000,000	16,000,000	16,000,000	17,000,000	17,000,000	17,000,000	17,000,000
FABRICATION PROPERTIES								
Machinability Rating**		30	30	30	30	20	20	20
Cold Working		E	E	E	E	E	E	E
Hot Working		P	F	F	G	G	G	E
Hot Working Range °F			1350-1550	1500-1650	1450-1650	1400-1600	1400-1600	1400-1600
SPECIFICATIONS								
A.S.T.M.		B36-43T Alloy #8	B36-43T Alloy #6	B36-43T Alloy #4	B36-43T Alloy #3	B36-43T Alloy #2	B36-43T Alloy #1	B152-42T
Federal		QQB611A Comp C	QQB611A Comp E					QQC501A
Navy		47B2INT Aug. 15, 1944	OS1331 47B2INT Aug. 15, 1944				OS819	47-C-2f
Army			(57-172-10) (57-173B)	57-160	57-160	57-171-1B	57-171-2	57-226A
AMS			4505A					4500

(a) Phosphorized Copper (b) Oxygen Free Copper E—Excellent G—Good F—Fair P—Poor
*Hard temper values are for strip reduced 4 B & S gage numbers in thickness by cold rolling.
All figures are nominal values and should not be used as specifications. **Machinability rating.

COPPER ALLOY BULLETIN

CAUSES OF CORROSION

This article is one of a series of discussions by C. L. Bulow, research chemist of the Bridgeport Brass Company.

ACCELERATED CORROSION — Cold Wall Effect *(Cont.)*

We shall now consider the "cold wall effect" in relation to stress corrosion cracking. The contamination of a condensate by ammonia or ammonium compounds from steam or the products of combustion (from coal or gas fired furnaces and water heaters) may lead to stress corrosion cracking of stressed brass condenser tubes or basement cold water pipes. This type of corrosion is found in plants such as oil refineries where ammonia gas is used for neutralizing acid vapors. Stress corrosion is much more localized than the corrosion grooves described in our previous discussion, and is characterized by very narrow cracks which penetrate the metal from the surface facing the corrosive atmosphere or solution. See microstructure illustration in figure 1. There may be a single crack, which eventually opens up as shown in figure 2, or a network of many cracks.

Fig. 1. Photomicrograph of yellow brass tubing showing transcrystalline cracks starting at surface.

The time required to penetrate a yellow brass rod, sheet or tube varies considerably depending primarily upon the combined action of:

1. Amount of ammonia or similar nitrogen compounds.
2. Magnitude of the stresses.
3. Inherent susceptibility of the alloy to this specific type of attack.
4. Amount of water vapor.
5. Amount of air.

If conditions are severe enough, stress corrosion on the outside of a cold tube or pipe may proceed much more rapidly than the type of corrosion occurring on the inside.

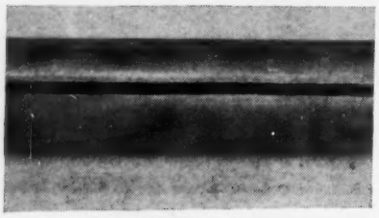

Fig. 2. Yellow brass tube with fully developed crack.

Brass and Copper

(Continued from page 1)

as other materials, and consequently, will stand severe cold working with fewer intermediate annealing operations. It will soften above 450°F. Since it oxidizes readily at elevated temperatures, its surface should be protected by a reducing or neutral atmosphere during annealing. Copper can be readily polished and plated, and will take on beautiful finishes. Copper is used in the manufacture of electrical equipment such as electric switches, terminals, lighting fixtures, serving trays, percolators, creamers and sugar bowls, electrical appliances, radios, automobile radiators, gift items, clock cases, enamelled goods, cooking utensils, garden sprayers, concrete road expansion joints.

Electrolytic Tough Pitch Copper (contains small quantity of copper oxide). Used in far greater quantities than other grades. Has high electrical conductivity and can be stamped, formed, spun, brazed or soldered. Not suitable for oxyacetylene welding because it tends to become brittle at some distance from the weld.

Phosphorized Copper (deoxidized with phosphorous). Has lower electrical conductivity than tough pitch copper. Used for operations involving extra deep drawing or flanging. Can be welded by the oxyacetylene method without becoming brittle.

Oxygen Free Copper. Has high electrical conductivity and is free from both phosphorous and cuprous oxide. Suitable for extra deep draws. Used where pure copper is required, i.e. radar, electronics and other exacting electrical requirements.

NEW DEVELOPMENTS

This column lists items manufactured or developed by many different sources. None of these items has been tested or is endorsed by the Bridgeport Brass Company. We will gladly refer readers to the manufacturer or other sources for further information.

A Saw Blade for the rapid cutting of ferrous and non-ferrous alloys has an innovation in the design of teeth to permit rapid production, parallelism and close tolerance over the entire finished cut, according to a recent announcement. **No. 590**

Plexiglas Masking Jigs are available for copper plating. Machinability, dimensional stability, and light weight are said to make this material valuable in reducing rejects and in stepping up production rates. Carbon rings to be plated are inserted in grooves 1/64 in. wide on either side of the Plexiglas jig rings. **No. 591**

A New All-Purpose Disc Grinder, said to be suitable for use with any type of metal, wood or plastic material, is available in 3- and 5-h.p. models. Principal features claimed are (1) a 30-in. disc with 26-in. high grinding area; (2) hydraulic controls that eliminate all gears, worms and jack screws ordinarily employed for raising, lowering and tilting the table; (3) an accurate position stop provided on protractor for stopping table in any position from 45° down to 15° up; (4) ventilated table with properly placed perforations to channel dust into highly efficient dust guards; and (5) paper or cloth abrasive discs may be removed and replaced without removing the steel disc. **No. 592**

Dependable Temperature Regulation is reported with a new control for electrically heated furnaces, ovens, and similar units. An on-off contacting system feeds to the heating unit the current needed to hold temperature to the required control point or program. Input is either full-on or full-off. Regulation is obtained by controlling automatically the time during which current is on and off. Other features reported are full proportional time action, automatic drop-correction, and optional "overshoot control" for use in bringing temperature up to desired heat. **No. 593**

Revised Duronze Manual

Revised Manual with new tables, curves and other physical data now off the press. If interested in improving existing products or making new ones, be sure to write for a free copy of this 80-page technical booklet.

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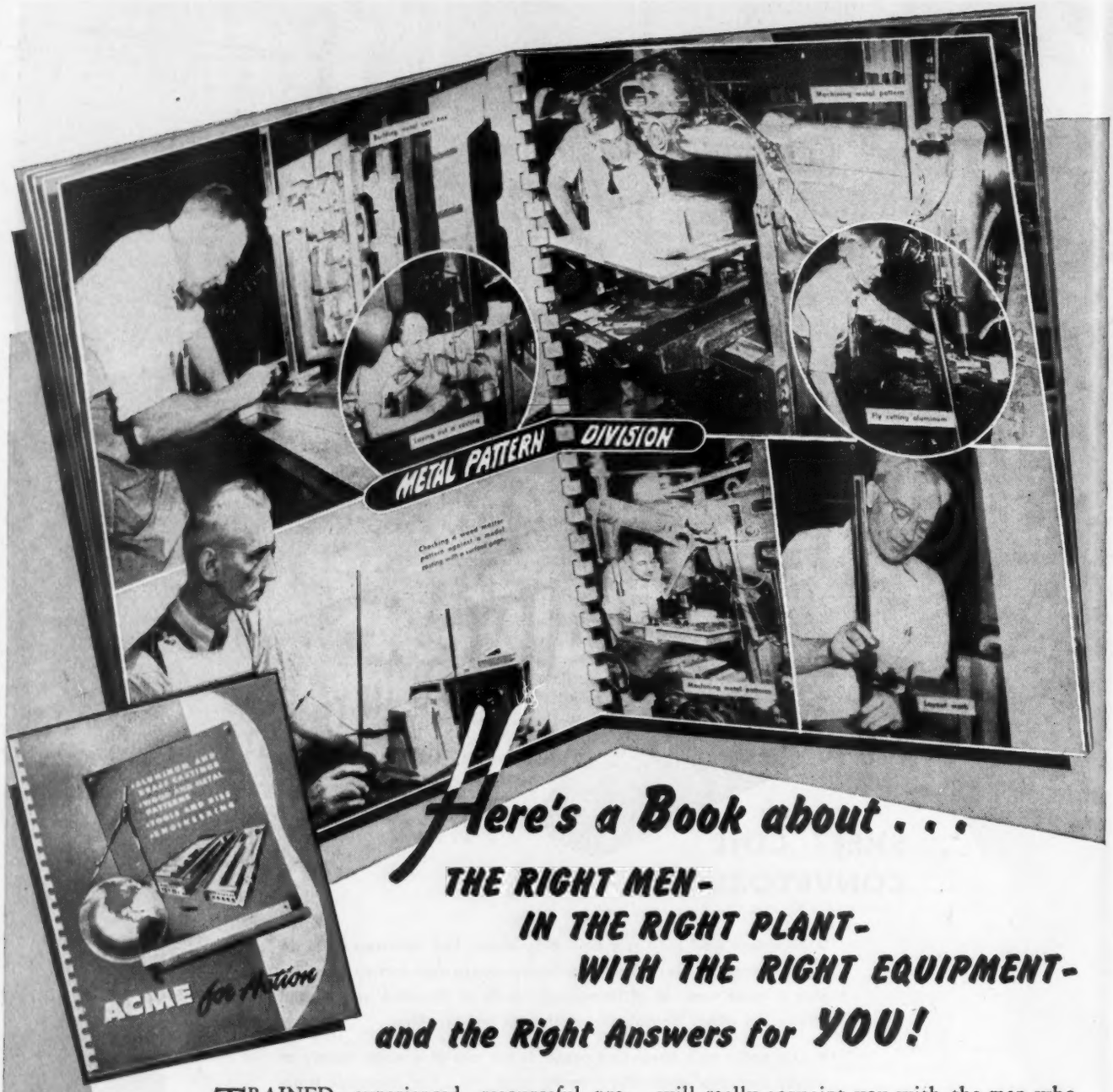

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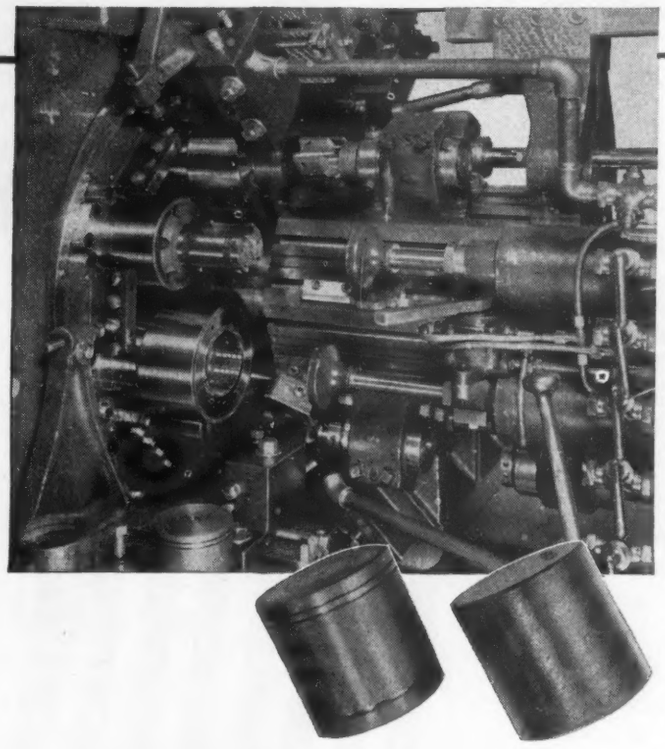

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• • •

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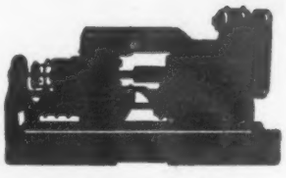

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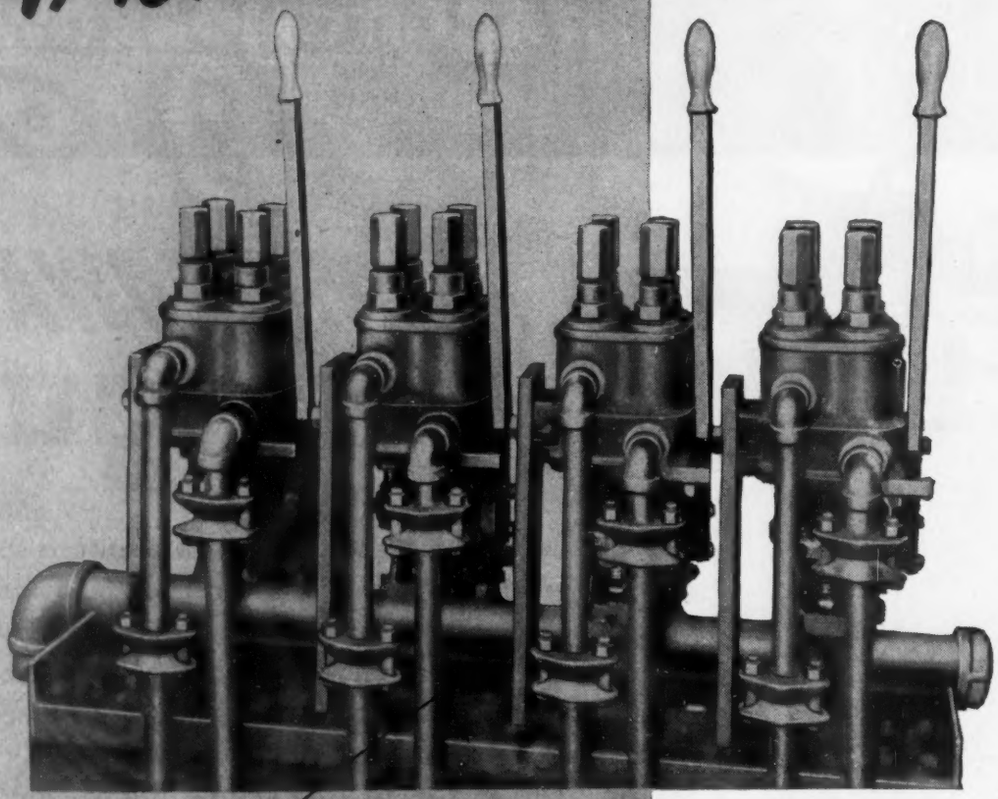

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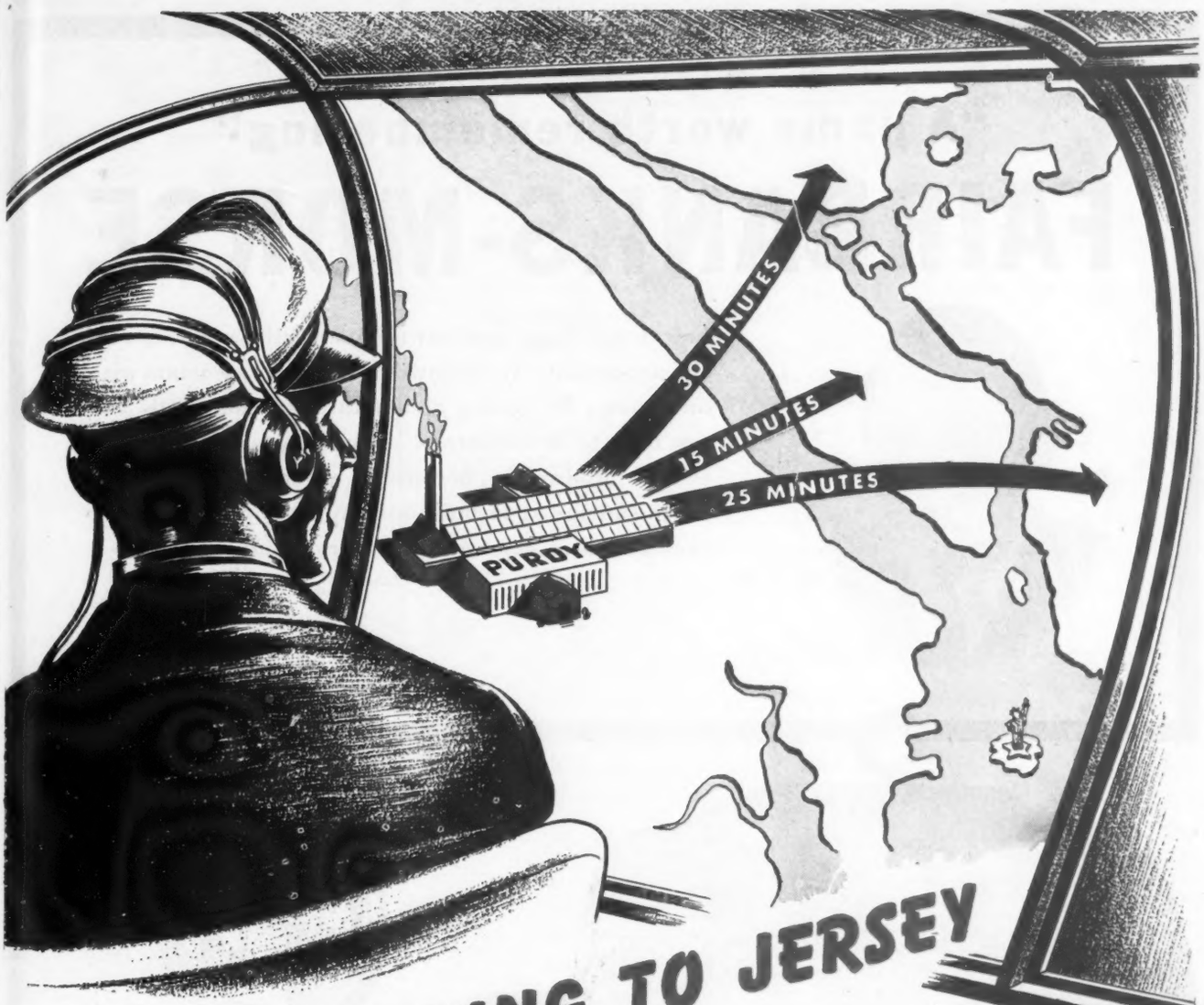

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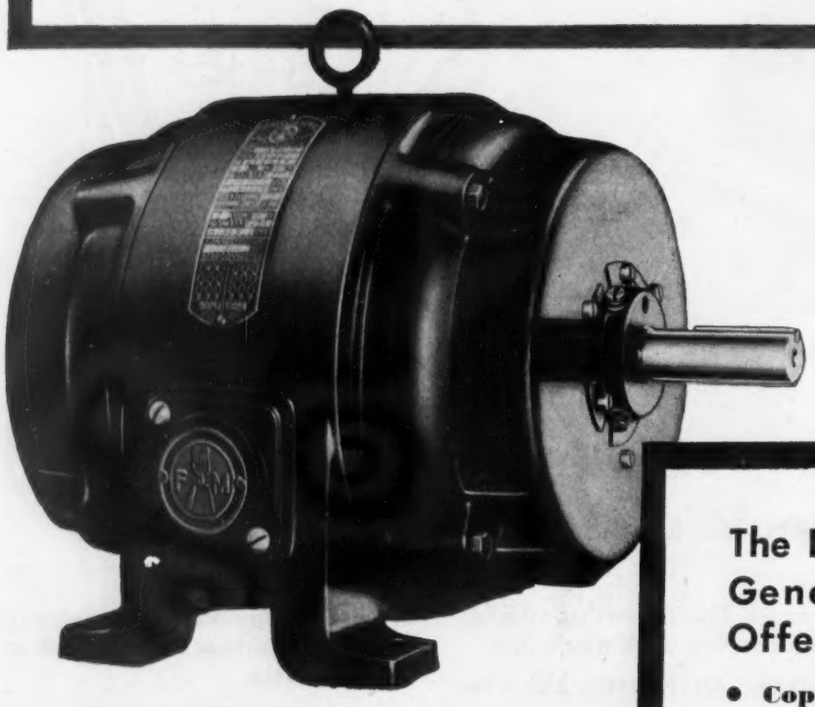

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Published by THE PENTON PUBLISHING CO., Penton Bldg., Cleveland 13, Ohio, E. L. SHANER, President and Treasurer; G. O. HAYS, Vice President and General Manager; R. C. JAENKE, Vice President; F. G. STEINEBACH, Vice President and Secretary; E. L. WERNER, Assistant Treasurer.

Member, Audit Bureau of Circulations; Associated Business Papers, Inc., and National Publishers' Association.

Published every Monday. Subscription in the United States and possessions, Canada, Mexico, Cuba, Central and South America, one year $6; two years $10; all other countries, one year $12. Single copies (current issues) 25c. Entered as second class matter at the postoffice at Cleveland, under the Act of March 3, 1879.

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STEEL

The Magazine of Metalworking and Metalproducing

VOL. 116 NO. 6 FEBRUARY 5, 1945

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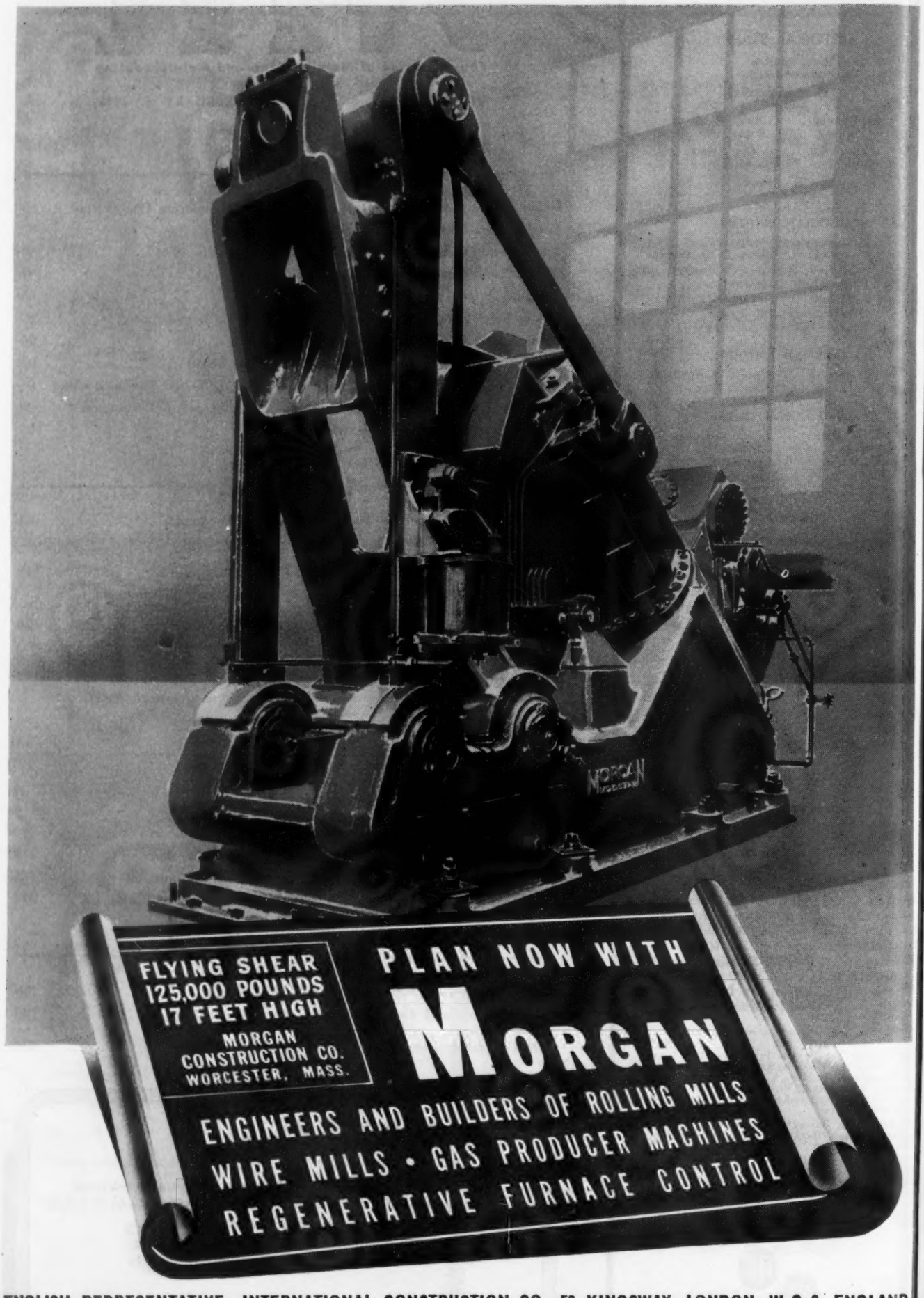

ENGLISH REPRESENTATIVE: INTERNATIONAL CONSTRUCTION CO., 56 KINGSWAY, LONDON, W.C. 2, ENGLAND

STEEL
February 5, 1945

Strengthening Congress

It would be difficult to over-estimate the importance of the Robert Heller report entitled "Strengthening the Congress," which was released to the public about three weeks ago. The report, consisting of 14 concrete recommendations, was prepared for the Business Committee of the National Planning Association and has been endorsed unanimously by the agriculture, business and labor committees of that organization. It also has been submitted to competent critics throughout the nation and has received general approval wherever its proposals have been studied carefully.

The program, which was outlined in the Jan. 22 issue of this publication, embraces: 1. Reorganizing the structure and reducing the number of standing committees in both houses of Congress. 2. Establishing a Majority Policy Committee and a Minority Policy Committee in each house. 3. Providing adequate staff assistance for members of Congress. 4. Providing staff assistance and expanding legislative reference service for committees. 5. Eliminating the filibuster. 6. Expanding provisional legislation. 7. Discontinuing riders unrelated to the main purpose of bills. 8. Developing a trend toward broad and away from detailed appropriation bills. 9. Using the general accounting office more effectively for control of executive expenditures. 10. Experimenting with questioning executive department heads before each of the whole houses. 11. Holding more frequent formal and organized inquiries into basic national problems. 12. Finding a substitute for the seniority rule in choosing committee chairman. 13. Increasing salaries of members of Congress to $25,000 per year. 14. Providing for service retirement pay.

It must be obvious to everybody that if these proposals, all of which can be effected by Congress itself, were adopted as a unified program, they would strengthen Congress tremendously. In time, the results would be apparent not only in the more efficient functioning of that body but also in the high caliber of men and women elected to its membership.

Such improvement would be of incalculable benefit to American industry, particularly in the difficult period ahead when practically every major problem of industrial operations will be affected to a greater extent than ever before by governmental policies and actions. The sooner the recommendations of the report can be put into effect, the better will Congress be able to grapple with the difficult problems of the transitional and postwar periods.

WINTER AIDS HITLER: Heavy snows and sustained low temperatures, particularly in the Buffalo, Cleveland, Youngstown and Pittsburgh districts, have hampered transportation, mining and industrial operations to the point where war production is suffering severely. The situation has been serious enough to justify temporary embargoes on railroad freight traffic, which have extended the adverse effect of the weather into a large portion of the northeastern industrial section of the country.

At Buffalo steel ingot production last week sank to a new wartime low of 23 per cent of capacity and averaged only 43 per cent for the week. Steelworks operations were curtailed in Cleveland, Youngstown and Pittsburgh but not as drastically as in Buffalo. Delay in the shipments of coke has affected the operation of some blast furnaces and foundries.

The coal situation, already acute, is viewed with concern because the contracts with miners expire on Mar. 31. Steel producers have suggested that the miners' unions present their demands in advance

(OVER)

of the expiration date to minimize the danger of a work stoppage.

In view of the present critical situation, a coal strike in April would be disastrous. Inasmuch as the miners will be dealing with the government more than with the operators, Washington might well start negotiating now. —p. 83

• • •

U. S. SUPPLIED 27%: Purchase by the British government of 58,000 American-made machine tools that originally were delivered under lend-lease arrangements brings to light an interesting picture of Britain's wartime machine tool situation.

During the war, the British have installed 459,000 machine tools in their war industries. Of these, 335,000 were built by United Kingdom manufacturers, 66,000 were purchased for cash in the United States and the remaining 58,000 were provided by the United States under lend-lease. Thus 124,000 or 27 per cent of the machines installed by Britain for war purposes were of American origin.

It is interesting to note that the British paid $31,500,000 for the 58,000 machine tools. The original cost to the United States, including the cost of tools lost in transit and other items, was $166,000,000. The sale price is based upon depreciation due to intensive use under wartime conditions and represents the estimated value of the machines after they are no longer required for war production. —p. 87

• • •

CHECKS AND BALANCES: A reassuring aspect of our democratic government is the manner in which the system of checks and balances, created by our forefathers, bobs up now and then to renew our confidence in justice. Judge Philip L. Sullivan of the Federal District Court at Chicago—an appointee of President Roosevelt—has rendered a decision in the Montgomery Ward case which is bound to make the federal administration "stop, look and listen" before it utilizes war powers to ride rough-shod over individual rights unnecessarily.

Montgomery Ward has not been blameless in this feud, but Sewell Avery has been a needed champion of certain constitutional rights. Whether or not the higher courts sustain Judge Sullivan's ruling, his decision serves as a timely warning against the abuse of concentrated federal power.

President Roosevelt has appointed seven of the nine Supreme Court justices, but already this august body has split into the conventional right, center and leftish factions. The independence and integrity of the judicial mind are heartening. —p. 94

MILITARY RESEARCH: Dr. Vannevar Bush, director of the Office of Scientific Research and Development, touched upon an important subject when he told the House Special Committee on Postwar Military Policy that this nation must perfect an organization to carry on a continuous program of military research after the war.

"Today a single complex unit of offense or defense, such as a radar-controlled anti-aircraft installation," he said, "may cut across many of the traditional branches of the military services. A complex weapon on the order of the German V-bombs might involve the Chemical Warfare, Air Forces, Signal Corps, Engineers and Ordnance branches. . . . No one branch sees the whole picture. No one branch can give overall direction."

The need for a better utilization of technological research to insure national security will call for radical changes in military organization and policy as soon as the present war ends. —p. 92

• • •

PROGRESS IN MARKING: From the earliest days of craftsmanship in iron, steel and nonferrous metals, men have taken pride in labeling the products of their handicraft with identifying marks. Pioneer gunsmiths, tool and die makers and machine manufacturers were careful to affix their trademarks to everything that went out from their shops. As industry developed, the marking of products was extended to include operating instructions, gage and size indications and numerous other items of information beyond the conventional labels of company and trademark.

In view of this widespread practice of marking metals, it is curious that the literature of the metalworking industries affords such a dearth of articles on printing, engraving, stamping, embossing, etching, scribing and stencilling metals and metal products. Today, when army ordnance and navy equipment impose extraordinary problems in metal marking, it is especially important that manufacturers be informed of notable recent progress in this field.

That is why the editors present a series of two articles on metal marking, beginning in this issue. —p. 120

E. L. Shaner

EDITOR-IN-CHIEF

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TUNE IN THE TEXACO STAR THEATRE WITH JAMES MELTON SUNDAY NIGHTS ★ METROPOLITAN OPERA BROADCASTS SATURDAY AFTERNOONS

Typical of the jammed freight yards in the northeastern states is the Bedford yard of the Pennsylvania railroad near Cleveland. The yard is more than half full when it should be nearly empty at this time of year. Delays of 24 to 48 hours in breaking up trains are not unusual. Photo by Norbert Yassanye, Cleveland Plain Dealer

Freight Tie-ups Hamper War Output

Heavy snows, severe temperatures cause traffic snarls. Steel and other war plants feel pinch in coal, fuel oil and scrap supplies. Finished products back up in producers' works for lack of cars. Flood feared at Pittsburgh

WAR plants in the northern areas, already under pressure to produce the greatest possible amount of materiel for the battles against Germany and Japan, now are at grips with a third major antagonist—the most severe winter in years.

Heavy snows and sustained low temperatures have created a crisis in transportation. Shipments of coal, fuel oil, scrap and other raw materials to war plants in affected districts have been slowed to a snail's pace. Outgoing movement of finished products likewise has been hampered.

The double-barrel handicap of being unable to obtain sufficient fuel and raw materials and of having finished products overflowing storage room has caused some plants to close down and has seriously slowed production in others.

To alleviate the situation, week-end rail embargoes have been imposed in the northern states, with only war freight permitted to move. This has helped to clear the congestion at some points, although apparently creating unnecessary hardships at others.

The outlook for an early improvement in operating and transportation conditions is none too promising. Coal stocks which have been below normal all winter have been further depleted, and there is little hope that these can be built up again in the near future. Mining operations at a number of mines were interrupted because of a lack of cars to load, and this loss in production will be difficult to overcome. Bituminous coal production for the week ended Jan. 20 was 11,960,000 tons, a decrease of 190,000 tons from the preceding week and 690,000 tons under the comparable week a year ago. During the calendar year to Jan. 20, soft coal production amounted to 34,685,000 tons, a decrease of 4,195,000 tons from the total output in the similar period last year.

Finished goods which have been stored on the producer's premises when cars were unavailable will add to the railroads' already heavy burden when normal freight movement can be resumed. The effects of the present congestion probably will be felt until well into the spring.

Another potential blow to war production that is causing concern, particularly in the Pittsburgh district and below, is the possibility of a serious flood when the heavy, accumulated snows melt. This threatens to disrupt not only steel and other war production, but also to impose more difficulties on the raliroads as many terminals are located in low-lying territories.

Due largely to weather conditions, with manpower shortages contributing, steel operations last week dropped to 91 per cent of capacity, 2½ points below the previous week, and 9 points below the like week a year ago when mills were operating at 100 per cent.

Areas most seriously affected by the weather conditions were Buffalo, Cleveland, Pittsburgh and Youngstown, from which comes a large share of the steel and coking coal used in other war production centers.

At Buffalo, probably the most seriously affected area, ingot production last week reached a new wartime low of 23 per cent and averaged only 43 per cent for the week. Bethlehem's Lackawanna plant was operating as low as ten of its 30 open hearths, Republic shut down all nine of its open hearths, while Wickwire Spencer closed down all four of its furnaces.

All mills in the district reported coal stocks unusually low. Wickwire Spencer, however, was the only producer attributing its shutdown to lack of fuel. Both Bethlehem and Republic placed their production slashes to lack of freight cars. Top urgency finished steel was jammed in finishing and rolling departments of the mills.

Donner-Hanna Coke Corp. was maintaining operations by utilizing a high priority to obtain material.

Just as some progress was being made in clearing freight yards at Buffalo late last week, a new storm arrived to complicate the situation. Winds of gale force ranging up to 65 miles an hour caused

Line engine waits in the Bedford, O., yard of the Pennsylvania railroad while track workers spike a switch in reverse so it can enter the yard. Photo by Yassenye, Cleveland Plain Dealer

increased drifting of fallen snow and railroad officials reported drifts up to five feet along the lines.

When snow piles up in the freight yards, the cars jam in the yards. Other cars en route are shifted onto sidings. When the weather is extremely cold, as it has been for several weeks, the coal freezes as solid as ice in the cars and from two to five days are required to thaw it. All sorts of subsidiary troubles arise to plague the carriers. Lots of manpower is required to clear the tracks. Ordinary snow plows are of little use, as the snow is only moved from one track to another. It becomes necessary to load the excess snow into freight cars and haul it out of the yards, a slow and tedious process.

Buffalo doesn't expect to dig out of its traffic jam entirely for weeks. As one transportation executive said: "War plants will feel effects of the tie-up for months."

At Cleveland, the bogging down of rail and truck deliveries of coal, scrap, and shipments of finished products, combined with a shortage of natural gas supply, has disrupted operations in many plants.

Delays of 24 to 48 hours in breaking up and classifying freight coming into the Cleveland district have been the rule rather than the exception. The Bedford, O., yard of the Pennsylvania railroad, which has a capacity for about 2100 cars, recently was more than 80 per cent full of freight. The New York Central has been hard pressed to break up a congestion of 1500 cars at Ashtabula. Truck transportation facilities, strained for months, have suffered severely, with many roads blocked and breakdowns increased.

To meet the natural gas shortage, government procurement agencies instituted a rationing system. War contractors were divided into seven divisions and gas allocated only to the most critical. Production of 155-millimeter shells, drive shafts and transmissions, axles and transfer cases, springs and various types of castings have been reduced substantially.

Coal shortage caused Republic Steel to bank three of its five blast furnaces at Cleveland and reduce the wind on a third. Coke ovens also were banked, and some open hearths were shut down.

Steel and finished goods have backed up on the producer's premises.

At Youngstown, steel producing and other metalworking companies are hard hit by the transportation tie-up, a situation which was aggravated by the rail embargo which cut down the quantities of coal available. Steel producers closed a number of open hearths, banked or reduced wind on blast furnaces. Steel backed up in mills and warehouses.

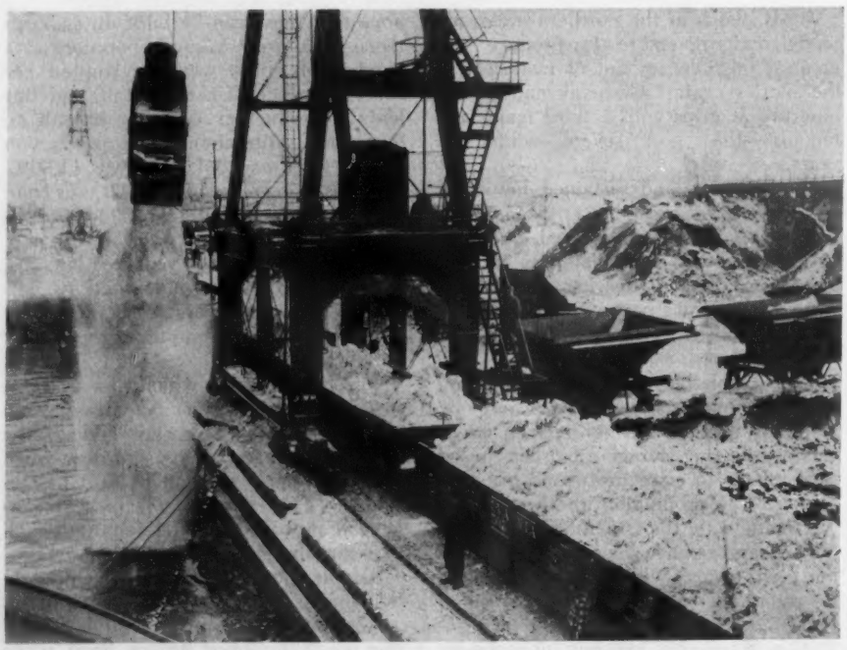
A similar situation prevailed at Pittsburgh. Forty-five open hearths were down, wind was reduced on most blast furnaces of the leading producer, and finished steel overflowed storage facilities. Chief danger point lies in the coal and coke shortage, largely because of the difficulties of building up stocks during periods of high consumption.

In Detroit, the rail embargo was relaxed within Detroit switching limits and what might have been an areawide shutdown of war plant operations was avoided. Detroiters believe there was no actual necessity for an embargo in that area, as weather conditions have not been comparably bad with other Midwest industrial centers. What rail congestion existed r e s u l t e d from choking up freight centers to the east, and the three-day embargo had little effect in clearing conditions there which stem largely from shortages of materials and manpower, plus accumulated deterioration.

Industrial coal stocks are in good condition, although not normal. Ford Motor Co. has about a three weeks' supply, contrasted with normal month to six weeks' supply.

Freedom of interplant movement of

(*Please turn to Page* 208)



Conventional snowplows are of little utility in freight yards, as they only push the snow from one track to another. Consequently removal of the snow from the yard is necessary. At Buffalo, steel mills offered their assistance in clearing the yards. Photo shows snow from the yards loaded into freight cars and being dumped into the Union slip at the Hanna Furnace Co. docks

Pittsburghers Fear Spring Flood

Heavy, accumulated snows may cause disaster if thaw is rapid. Thirty per cent of steelmaking and finishing capacity would be affected. Snowfall ranges from 30 to 110 inches

STEEL and other war industries located in the Ohio, Monongahela and Allegheny watersheds are apprehensive they will receive another body blow to production when the spring thaw arrives.

Heavy snows which have accumulated since November threaten the highly industrialized area around and below Pittsburgh with the worst flood since 1936, when steel mill operations dropped from 90 per cent to 50 per cent and the mills and other metalworking plants suffered extensive damage to electrical equipment, stocks and other property.

The flood threat also is worrying transportation officials as many of the freight yards and terminals are on low ground.

Despite construction of additional dams, flood walls and similar works since the 1936 flood, the potential danger is the greatest in history because of the unprecedented blanket of snow covering the territory and amount of ice jamming the rivers. Snowfall has been heavy throughout the watersheds and has ranged from 30 to 110 inches, the latter depth being recorded at Corry, Pa. Reports from practically all districts are to the effect that the entire accumulation of snow is still on the ground with drifts rising in many places as high as 15 to 20 feet. The amount of water which will rush to the rivers depends upon whether there is a slow thaw or a prolonged period of warm weather accompanied by rain. If the latter conditions develop, authorities agree that the resulting flood will be the most disastrous ever experienced.

Officers of the Army Engineers Corps are quoted as estimating that flood control dams now operating, either on streams originating in western Pennsylvania or flowing into the danger zone, would cut five feet from a 46-foot flood crest under conditions similar to those of 1936. They would take four feet from a 40-foot stage, and three feet from a 35-foot stage at Pittsburgh where the "danger stages" begin at 28 feet. Crest of the flood in Pittsburgh in 1936 reached slightly above 46 feet.

More than 30 per cent of the nation's steelmaking and steel finishing capacity is located in the danger zone, extending from Johnstown, Pa., on the north to Portsmouth, O., on the south. At present operations, this amounts to about 2,250,000 tons of ingots a month.

Scrap Stocks Continue Downward Trend

Stocks of iron and steel scrap at plants of consumers, suppliers and producers on Nov. 30 approximated 5,624,000 gross tons, a decline of about 200,000 tons from the preceding month's inventory total, the Bureau of Mines states.

A further decline in stocks of purchased scrap held by consumers, 163,000 tons, was again the important factor in the latest scrap inventory decline; in addition, stocks of home scrap were reduced 96,000 tons. Dealers' stocks rose 51,000 tons. From Aug. 31 to Nov. 30 last, stocks of purchased scrap held by consumers have decreased a total of over 450,000 tons. Since then a further decline is believed to have occurred.

The average daily consumption of purchased and home scrap during November recorded little change from the October rate.

Freight Rate Adjustment Hearing Set for Feb. 6-7

Public hearings on proposed adjustment of freight rates and carload minima on certain commodities will be held in Chicago at the Palmer House Feb. 6 and 7. Seeking to encourage maximum use of railroad freight cars by heavier loading the eastern railroads are considering establishing rates 10 per cent lower than present rates on domestic shipments of higher specific carload minimum weights of certain commodities moving within official classification territory.

On articles manufactured of iron and steel a minimum of 100,000 pounds is proposed, hearing on which is scheduled for 10 a.m. Feb. 7.

Present, Past and Pending

■ U. S. ENGINEERS RECONSTRUCTING FRENCH RAILROADS
NEW YORK—United States Army engineers have restored 5000 miles of double track and 2000 miles of single track and have reconstructed 172 major rail bridges in France and Belgium.

■ RHEEM AWARDED NEW CONTRACT BY ARMY
HOUSTON, TEX.—Rheem Mfg. Co. was awarded Army contract to machine 4.2 inch steel mortar shells for chemical warfare use. Rheem's present Houston plant is producing antitank and personnel mines and steel shipping containers.

■ INDIANAPOLIS UTILITY AWARDS COKE OVEN CONTRACT
NEW YORK—Wilputte Coke Oven Corp. has been awarded a contract by Citizens Gas & Coke Utility, Indianapolis, for construction of a battery of 47 coke ovens and auxiliary equipment.

■ WPB RESTRICTS ORDERS FOR STAINLESS STEEL
WASHINGTON—War Production Board has prohibited temporarily filling of orders for stainless steel subject to deferred allotments and the filling of orders to build up warehouse inventories of steel.

■ INDUSTRIAL DIAMOND ANTITRUST SUIT FILED
NEW YORK—A civil suit, charging nine foreign corporations and seven of their American stockholders with conspiring to restrain and monopolize foreign trade in gem and industrial diamonds, was filed last week in U. S. district court in New York.

■ ACUTE LABOR SHORTAGE AREAS CUT BY ONE
WASHINGTON—Effective Feb. 1, 71 districts are classified by War Manpower Commission in group I, areas in which acute labor shortages exist, a decrease of one. Labor supply is easier in Adrian, Mich., and Portland, Me.; tighter in Atlantic City, N. J., and Talladega, Ala.

■ REROLLING MILLS TO RELIEVE "HOT MILL" SCHEDULES
WASHINGTON—Orders for steel products that can be made on rerolling mills will be shifted from "hot mills" whenever possible to relieve the latter's crowded schedules, War Production Board said last week. Directives for producing reinforcing bars on leading primary steel producers have been cut about 50 per cent.

■ QMC PLACES BULK OF CONTRACTS WITH SMALL BUSINESS
WASHINGTON—Army Quartermaster Corps in 1944 placed 60,652 prime contracts, valued at $1,510,660,000, with smaller business organizations, or 65 per cent of its total prime contracts and 46 per cent of the dollar value of all QMC depot contracts.

■ ALUMINUM INVENTORY RESTRICTIONS TIGHTENED
WASHINGTON—Users of 10,000 pounds or more aluminum sheet, strip and plate are now limited to inventories equal to 30 days' supply.

Breakdown of Steel Mill Product Shipments to Farm Equipmen

(Net Tons)

Products	1944*	1943	1942	1941	1940	1939	1938	193	1936
Semifinished (ingots, blooms, billets, slabs, tube rounds, sheet and tin bars)	19,500	24,473	29,338	79,653	60,526	.	.		
Structural shapes and sheet piling	34,600	22,609	23,614	50,306	54,384	23,685	22,392	61,2	43,030
Plates (universal and sheared)	54,100	43,972	41,127	52,490	39,278	18,874	26,096	88,0	64,759
Rails—60 lbs. and over	.....	55	99	.....	.....	.....	.....		
All other rails	.....	.....	7	.....	.....	.....	.....		
Total rails	.....	55	108	.....	.....	2	55		148
Tie plates and track accessories (incl. track spikes)	.....	2	16	.....	.....	1	12		18
Hot-rolled bars (carbon, incl. hoops and bands)	450,000	292,914	208,158	424,953	407,981	.....	.....		
Concrete reinforcing bars	. .	.....	568	.	636	38	62	6,1	8,938
Alloy bars	38,100	21,473	13,342	33,658	51,646	.....	.....		
Cold finished (carbon and alloy)	67,300	38,674	22,765	61,742	.....	.....	.....		
Total bars	555,400	353,061	244,833	520,353	460,263	206,407	168,340	540,6	469,953
Pipe and tubes	27,000	11,718	11,197	24,805	30,138	32,609	5,901	8,0	8,244
Wire rods	11,000	3,339	1,838	5,388	6,533	.....	.....		
Wire and wire products (incl. fence posts)	41,300	37,641	25,627	65,777	36,661	132,672	101,830	247,0	245,500
Black plate	900	2,694	431	150	70	182	62	1,3	717
Tin and terne plate (hot and cold reduced)	3,300	2,460	616	186	41	.	.....		
Sheets and strip:									
Hot-rolled	246,400	138,053	134,471	233,113	166,835	.....	.....		
Cold reduced	21,500	9,589	11,722	17,763	12,789	.....	.....		
Galvanized	80,100	40,805	32,694	77,430	45,239	44,814	42,642	68,2	55,076
All other	.....	975	4,311	5,133	3,609	.....	.....		
Total, sheets and strip	348,000	189,422	183,198	333,439	228,472	187,486	123,560	382,0	310,924
Tool steel bars	35	36	234	597	1,864	.....	.....		
Wheels and axles	.....	3	.....	.....	.....	.....	.....		
Forgings	.....	741	2,883	3,155	.....	.....	.....		
Steel castings	.....	.....	37	27	.....	.....	.....		
Skelp	.....	.....	.....	.....	.....	.....	.....		
All other steel products	500	20,625	4,951	17,300	1,272	28,229	16,384	12,7	20,071
Grand Total	1,095,635	712,851	570,046	1,153,626	919,502	630,147	464,694	1,341,0	163,365

*Estimated. †Represents hoops, bands and cotton ties. Blank spaces indicate figures not available.

Figures f

Agricultural Machinery Program For 1945 Slightly Lower Than 1944

SCHEDULED farm machinery production for the year ending June 30, 1945, is not expected to be sufficient to meet demand, even though manpower and materials supply permits these schedules to be met, which now seems unlikely.

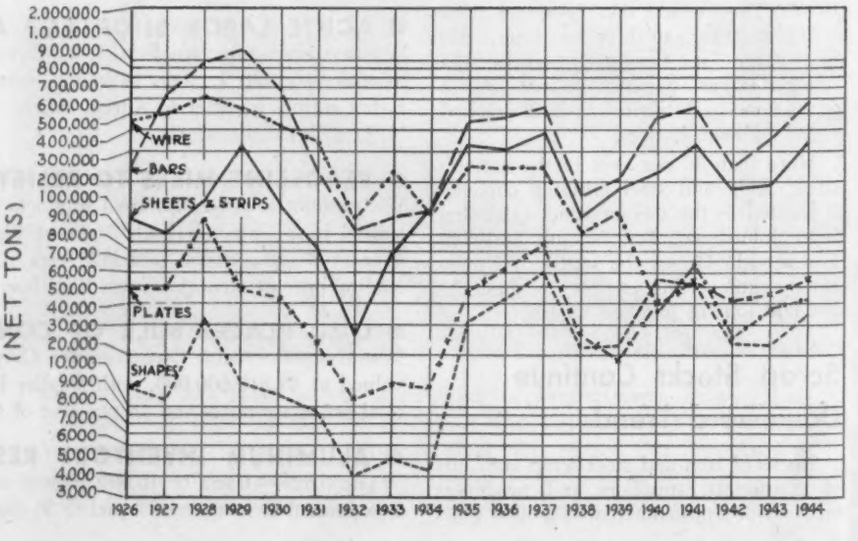
The 1945 program provides for a slight decline from that manufactured during 1944. However production of repair parts has been increased by $20 million. The program of $697 million for the current year is divided as follows: $455 million for new machines; $204 million for repair parts and $38 million for attachments. This compares with previous year's showing of $705.6 million, when $469.9 million in new machines, $199.8 million in repair parts and $35.9 million in attachments were produced.

The quantities of equipment authorized for production this year vary considerably by individual items, with the chief emphasis on labor-saving types. Production of certain harvesting and tilling machines has been increased to as high as 150 per cent over 1940 and 1941 levels. More emphasis has also been placed on planting and fertilizing equipment.

The possibility of obtaining in 1945 greater quantities of farm equipment than now authorized for production is dependent on the progress of the European war. However, the lead time necessary for production of many types of farm equipment will probably prevent any significant increase in the quantity of farm implements produced before late this year, even if the European war should terminate soon. No action has been taken on the supplementary farm machinery production program as submitted by the War Food Administration to meet the needs that have developed since the present production schedules were set, because of the present all-out emphasis on military production.

Current problems of farm machinery manufacture are indicated by the fact first quarter 1945 production year output of new machinery, exclusive of wheel tractors, repair parts and attachments, was about 25 per cent behind schedule. This production lag was caused by the manpower shortages and difficulty in obtaining components, chiefly malleable and

Farm Equipment Builders' Steel Purchases Show Recent Gain



Manufacturers by Product Classification from 1926 Through 1944

(Net Tons)

1937	1936	1935	1934	1933	1932	1931	1930	1929	1928	1927	1926
.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
61,24	43,030	31,781	4,478	5,074	4,108	9,233	12,067	15,679	32,183	11,268	13,114
88,0	64,759	47,394	12,727	13,894	11,010	23,005	43,351	48,420	120,123	48,884	49,459
.....	.....	.....	.....	.....	.....	.....	.....	812	1,053	671	550
.....	.....	.....	.....	.....	.....	.....	.....	308	116	59,068	13
.....	148	240	223	200	.....	147	580	1,120	1,169	59,739	563
3	18	58	40	58	36	276	569	1,341	167	150	123
.....	.....	.....	.....	18,364†	42,830†	71,051†	66,254†	111,014†	108,250†	29,432†	28,795†
6,19	8,938	1,764	7,579	5,600	560	11	1,347	7,840	.....	.....	.....
.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
540,6	469,953	443,988	136,123	125,255	100,921	222,537	677,382	1,176,578	998,182	640,880	228,401
8,0	8,244	9,952	3,722	3,718	2,289	2,716	4,991	24,037	8,275	3,512	12,507
.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
247,0	245,500	247,828	130,694	229,304	124,151	349,368	404,058	528,008	603,429	496,664	453,472
1,3	717	815	819	.....	60	48	.....	.....	.....	350	.....
.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
68,2	55,076	46,613	23,583	14,356	14,424	33,337	47,799	112,351	58,221	36,730	.....
382,0	310,924	321,181	135,271	76,852	26,495	83,498	148,090	324,377	159,606	103,842	125,961
.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
12,7	20,071	3,465	5,387	8,343	5,467	3,597	12,460	11,974	18,725	24,315	12,571
1,341,0	163,365	1,106,702	429,483	462,698	288,618	694,366	1,303,548	2,131,534	1,941,859	1,389,606	896,172

Figures for 1926-39 compiled by STEEL; for 1940-43 by American Iron and Steel Institute.

gray iron castings. Tightening in the steel supply situation over recent weeks threatens to further delay farm equipment production schedules.

Farm equipment builders, in common with other private users of steels, have been unable to place orders to cover their allotments due to the increased military requirements.

The production of farm machinery replacement parts was at a high level during 1944, and is expected to remain at that pace through most of this year. During 1944 output of replacement parts was from two to three times that of 1940 or other prewar years. Obtaining some items, such as replacement parts for engines and electrical equipment, has been difficult. Production of these components has conflicted with military production.

About 10 per cent of the new farm machines built this year will be exported, 7 per cent in commercial exports and 3 per cent through lend-lease.

During 1944 the agricultural implement and machinery manufacturers received an estimated 1,095,635 net tons of steel mill products. This compares favorably with the 712,851 and 570,046 net tons shipped them during 1943 and 1942, respectively. With the exception of 1941, the steel shipped to farm equipment companies last year was the largest tonnage recorded since 1937. Peak in steel shipments to this group occurred in 1929, totaling 2,131,534 tons.

Expressed in percentage of total mill shipments, the estimated farm equipment 1944 share represents 1.8 per cent.

British Buy 58,000 American-made Tools Shipped Them by Lend-Lease

NEGOTIATIONS have been concluded for sale to the British of some 58,000 American-made machine tools that originally were delivered on lend-lease, according to Leo T. Crowley, administrator of the Foreign Economic Administration.

In exchange for full title to these tools, attachments and spare parts, the United Kingdom government has paid the United States $31,500,000. As a result of this transaction and other purchases of machine tools by the United Kingdom, there will be no machine tools of American origin in the possession of the United Kingdom government that have not been purchased.

Lend-lease has provided only a relatively small portion of total United Kingdom machine tool needs. During the war the British have installed 459,000 machine tools in their shipyards, aircraft factories, munitions plants and other war industries. Of these, 73 per cent were provided by United Kingdom manufacturers; 14.5 per cent were purchased for cash in the United States and the remaining 12.5 per cent were provided by the United States under lend-lease.

Original cost to the United States of the lend-lease tools was $166 million, including cost of those shipments lost by enemy action while enroute to England or thereafter, and tools which will be of relatively small value to the British for postwar use. Amount paid by the British is based on depreciation due to the intensive use of the tools under wartime conditions and represents an agreed estimate of the value they will have after they are no longer required for the war effort.

Current U. S. requirements were canvassed to determine that no need for these tools exists in the United States at the moment, Mr. Crowley said.

The transaction resulted from the recognition by both governments of the special problems associated with machine tools, which they felt should be solved in advance of the end of hostilities. In the absence of agreements made under the Lend-Lease act the United States retains ownership of all lend-lease material made available to our allies. Consequently, British manufacturers were unable to estimate their future tooling needs as long as part of their present equipment was held only on this uncertain basis. It was agreed in this case, therefore, in the interest of both governments, that a special arrangement be undertaken prior to the end of hostilities, which would transfer title to the tools to the British.

February Steel Price Rise Possible

OPA to discuss industry costs with advisory committee within two weeks. Warehouse position being analyzed as is that of other buying groups

WARREN M. HUFF, steel price executive, Office of Price Administration, told STEEL last week that he plans to discuss with the General Steel Products Advisory Committee within the next two weeks the results of the latest OPA survey of steelmaking costs.

On that occasion the committee will have an opportunity to make application for increases in steel prices over and above the recently effected interim increases of $2 to $5 per ton on a number of products.

While Mr. Huff did not go into detail, he admitted that steelmaking costs have risen and that price increases are warranted on a large number of carbon steel products.

"Some of the new prices that the OPA will allow," he said, should become effective before the end of February.

"When the OPA announced the interim increases in January," said Mr. Huff, "it had no information as to the earnings and profits position of steel warehouses. Under the price stabilization law it was prohibited from allowing the increases in steel prices to be passed along by the warehouses unless it had ascertained the warehouses needed relief.

"To prevent the increases from being passed on to customers of the warehouses in the absence of such information, the OPA used the device of increasing delivered prices.

"The OPA," Mr. Huff continued, "now is conducting a study to enable it to determine what relief, if any, the steel warehouses will need.

"It is the present OPA plan to apply such increases as may be granted directly to mill base prices, in which event the warehouses automatically would apply the OPA warehouse mark-up to the higher steel prices. These mark-ups will be reviewed.

"The OPA is working along the same line with the advisory committees representing the bolt and nut, screw, and steel drum manufacturers, the nonintegrated tubular products producers, the wire products producers, the cold-drawn bar producers, the cold-rolled sheet mills, the fabricated reinforcing bar industry, the fabricated structural steel industry, the secondary warehouse distributors, the merchant and oil country pipe distributors, and other groups.

"The OPA, by studying the earnings and profits data of all these industries, will determine whether the contemplated steel mill price increases will work hardships on them which will have to be alleviated."

WMC To Divert Manpower from Less Essential Industries to Newark's Critical War Plants

WITH their campaign for 20,000 additional workers in critical war industries in the Newark, N. J., area falling far behind actual needs, War Manpower Commission officials have announced they will impose sanctions on employers if the final phase of the drive is unproductive.

To date approximately 2000 or 20 per cent of the required number have been added to war plant payrolls since Jan. 1, when the campaign started.

In a final effort to avoid the application of stringent measures, WMC has invoked a "selective manpower ceiling" for 5000 less essential industries, by which manpower officials plan to shift about 10 per cent of the 200,000 workers in those plants to war plants.

Employers in these less essential industries have been requested to list employes and their skills for the early information of manpower officials. From this list WMC will designate those needed to fill the serious gaps in war production.

Should the plan fail, the commission will request the Federal Power Commission, the Office of Defense Transportation and the Office of Price Administration to apply sanctions within their scope, such as depriving plants of light and power, gasoline for their trucks, or the use of railroad cars for shipments.

TO THE RESCUE: With 10 per cent of Chicago's surface line cars out of service because of the manpower situation, city police and firemen have taken part-time jobs on street cars. Patrolman George Krull is shown here acting as motorman. NEA photo

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WLB Rules on Uncertain Points in Wage Decision

The National War Labor Board last week issued nine rulings interpreting certain provisions of the basic steel wage decision of Nov. 25 requested in a joint petition of the United Steel Workers and subsidiary companies of the United States Steel Corp.

The rulings follow: An employe assigned to the day shift who completes his regular eight-hour turn and continues to work into the second shift or afternoon shift does not receive the premium rate of 4 cents per hour for overtime worked in the afternoon shift. Similarly, an employe on the afternoon shift working into the second turn of eight hours into the night shift does not receive the premium rate of 6 cents per hour for overtime. The board made no determination on this rule in the case of an employe who continues to work an en-

tire second turn of eight hours in either afternoon or night shift. The matter is one for settlement by the parties in their collective bargaining negotiations. Any agreement reached may be placed in operation without approval of the board.

Whether an employe's overtime compensation should include the shift premium is subject to settlement by the parties in collective bargaining without approval of the board.

Whether the shift premiums should be paid those employes qualifying for allowed or reporting time compensation is a matter to be settled by the parties in their collective bargaining negotiations. Any agreement reached may be placed in operation without board approval.

Whether the parties in their collective agreement should incorporate a wage reopening clause as to the union's demand for a general wage adjustment is a matter directly related to the termination clause of their agreement, and should be settled by them in collective bargaining negotiations.

Whether the parties in their collective agreement should incorporate a re-opening clause as to the union's demand for a guaranteed annual wage was not presented to the board when it considered that demand of the union and consequently was not covered by the directive order. The issue is one to be settled by the parties in their collective bargaining negotiations.

The guide posts established by the board under Section X of the directive order should be incorporated in the collective agreement of the parties either by reference or by use of the exact language in the directive order without change.

Nothing in Section X of the directive order was intended to preclude the presentation of the collective agreement of the parties of grievances based upon alleged improper classifications.

In submitting to the parties for purposes of collective bargaining the question as to the amount of time worked in a higher rated job which would justify the transfer to the higher rated classifications, the board indicated its acceptance of the principle of upgrading a man.

The parties may mutually agree upon extensions of time within which to report to the board as to their negotiations concerning severance pay provisions and the board's approval of such mutually agreed extensions is not required.

Inland Steel Has 1944 Profit of $10,249,395

Inland Steel Co., Chicago, reports 1944 net profit of $10,249,395, equal to $6.28 a share on capital stock, compared with $10,801,564, or $6.61 a share, in preceding year. Edward L. Ryerson, chairman of the board, states 1944 steel ingot operations were maintained at a higher continuous rate than during any previous year, averaging 108.4 per cent with a total record ingot production of 3,684,147 net tons.

1944 Steel Earnings Cut Indicated

Based on reports of major producers so far issued, industry's net for the year will be down from 1943. Provision made for retroactive wage adjustment

PRELIMINARY financial reports of first few steel producers to report for 1944 indicate a moderate decline in earnings for the year. In each instance provision for retroactive wage adjustment cut deeply into fourth quarter earnings, but at the same time substantially reduced estimated federal income tax provisions.

Steel order backlogs at the close of last year were substantially unchanged from the preceding year. Steel operations were well sustained in 1944 at near capacity levels.

U. S. Steel Reports Net of $10,985,624

U. S. Steel Corp.'s final 1944 quarter net income was cut $4.3 million to $10,985,624 by a charge of $30 million for retroactive wage advances. Another result of this charge was a reduction of $25.7 million in federal income taxes.

For the full year 1944 the corporation reports preliminary net profit of $60,292,513, equal to $4.03 a common share, compared with $62,631,742, or $4.30 on common, in preceding year.

The corporation's estimated 1944 federal income tax was $63 million compared with $84,316,804 on 1943 income.

Irving S. Olds, chairman, states there were only minor cutbacks in orders during fourth quarter and these had been replaced by new business.

Discussing the possible purchase of the Geneva Steel plant at Provo, Utah, Mr. Olds said:

"There is no doubt we are interested in Geneva as a possibility. The sole question is can the plant deliver on the coast as cheaply as other plants. Additional facilities for finished products are necessary.

"Much depends upon cost of putting in the finishing mills. We have not made an estimate, but have heard others ranging from $30 to $90 million. The cost of Geneva plant thus far has been about $200 million."

Bethlehem's 1944 Profit Totals $36,167,723

Orders on hand Dec. 31 last of $1,344,000,000 were down from $2,109,000,000 from the close of the preceding year, Eugene G. Grace, president, Bethlehem Steel Corp, declared in announcing the corporation's 1944 net income of $36,167,723. The profit showing last year compared favorably with $32,124,592 in 1943.

He said reduction in order backlogs was due to completion of certain ship contracts. However, much ship work remains. Bethlehem yards engaged in merchant ship construction have enough ahead to keep them fully engaged for remainder of this year. The Quincy, Mass., yard, engaged in heavy navy work, is scheduled for full operation through 1947; the Staten Island yard, building destroyers, is booked until end of 1946.

Mr. Grace said the recent retroactive wage increase, as applied to shift bonuses and vacations, cost Bethlehem about $6.5 million.

Republic Has 1944 Net Profit of $10,130,296

Net profit of Republic Steel Corp., Cleveland, totaled $10,130,296, equal to $1.44 a common share, last year, compared with $12,011,057, or $1.77 a share, in preceding year. Federal income tax provision amounted to $31,400,000 in 1944, against $39,300,000 in 1943.

Corporation's 1944 sales totaled $531,235,000, compared with $552,329,000 in preceding year, and rate of ingot operations was 99.8 and 100.4 per cent in 1944 and 1943, respectively.

Jones & Laughlin Earns $7,519,668 Last Year

Jones & Laughlin Steel Corp., Pittsburgh, reports 1944 net income of $7,519,668, equal to $2.86 a common share, compared with $9,512,228, or $4.10 on common, in preceding year. Fourth quarter earnings totaled $2,041,634, against $2,451,647 reported in the corresponding 1943 period.

Wheeling Steel's Profit Totals $4,384,791

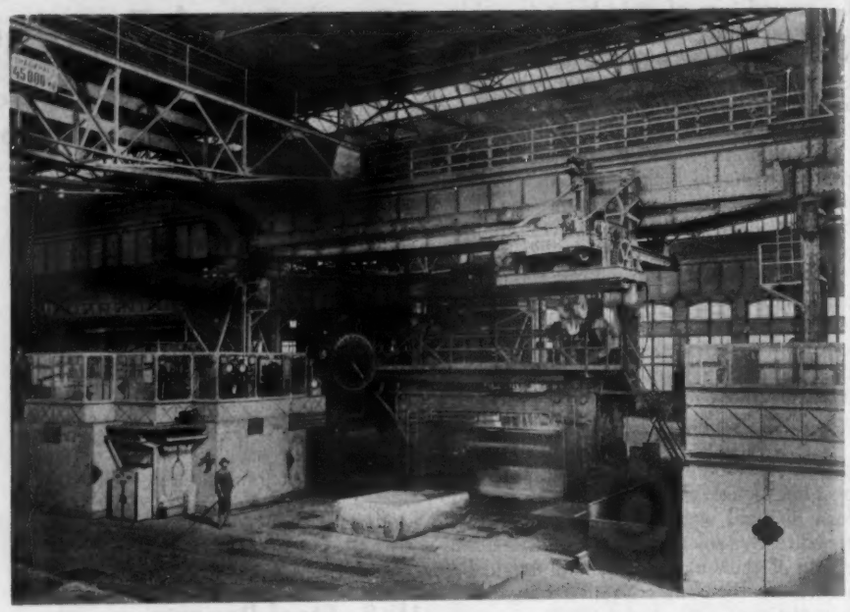
Wheeling Steel Corp., Wheeling, W. Va., reports 1944 net income of $4,384,791, equal to $4.51 a common share. This compares with $4,339,246, or $4.43 a share, in preceding year.

Keystone Steel Has Net Profit of $481,003

Keystone Steel & Wire Co, Peoria, Ill., had net profit of $481,003, or 64 cents a share on capital stock, for quarter ended Dec. 31 last. This compares with $490,568, equal to 65 cents a share, in like 1943 quarter.

Nazis Lose Critical Minerals

36 per cent of coal, 15 per cent of coke, 40 per cent of zinc and many metalworking and chemical plants fall to Russian army



Armor plate mill in Witkowitz is shown above. This is one of the steel mills gained by the Russians in their drive on the eastern front

FALL of a major portion of Silesia, Germany's "second Ruhr," to the Russians is a crippling blow to the Nazis' war effort. This southeastern province of the Reich is estimated by the Foreign Economic Administration at Washington to have: 36 per cent of Germany's coal, 15 per cent of its coke, 40 per cent of its zinc, 13 per cent of its lead, and two million tons of steel. Estimates from other sources say steel production is as high as five million tons. Also located there are arms factories, foundries, and chemical works.

Although the Russians have not completely occupied Silesia, the Nazis undoubtedly have lost the mineral and industrial production of that province, inasmuch as Silesia is only about 60 miles wide and with the Russians occupying half of that width the rest would be under the destructive influence of Russian artillery and aircraft.

The upper (or southern) part of Silesia is the richer industrial area of the province because of mineral deposits. Because the Oder river flows northwestward through Silesia the southern part of the province is on the upper reaches of the stream and is therefore known as Upper Silesia, while the part of the province to the northwest and downstream is often referred to as Lower Silesia. Area and population of Upper Silesia are smaller than those of Lower Silesia.

It is ironic that Germany should lose its "second Ruhr" before the Ruhr itself has been overrun. After early 1937 and particularly after the rise of American and British airpower, Germany systematically dispersed its industry, much of it being placed in Silesia so as to be far away from American and British bombs which apparently were anticipated over northern and western Germany. Hitler now finds the safeguard gone before the Ruhr itself, although the Ruhr has been pounded by Allied bombs.

In coal production Silesia was second only to the Ruhr. Both coking and steam coals of good grade are found in Silesia. The seams are thick and lie at shallow depths. In 1943 Silesian coal production was said to be approximately 90 million tons yearly, almost equaling the Ruhr output.

Among the leading zinc producing areas in Germany is the Blei-Scharley district of Upper Silesia. The deposits there range up to 30 feet in thickness and lie at depths of 300 to 750 feet. They underlie many square miles and average 16 per cent zinc and 4 per cent lead. It has been estimated that there are more than a million tons of recoverable zinc and nearly 400,000 tons of recoverable lead in developed ore reserves there, exclusive of the low-grade ore. Annual production of these Silesian deposits was estimated in 1943 at approximately 57,000 tons of zinc and 21,000 tons of lead.

A weakness of Germany's "second Ruhr" is the small quantity of iron ore reserves. The Upper Silesian ore is only 30 per cent iron. Although the Nazis had developed improved methods of extracting iron from low-grade ore the process was relatively costly; but that, of course, was no deterrent to a nation with a lust for ruling the world, for regardless of cost the expensive methods were considered a means of reaching the goal. In 1943, the Silesian iron and steel production reached only two million tons, while the Ruhr produced 14 million tons.

Although the enormous production capacity of the Ruhr built up in several generations could not easily be replaced by new installations it has been indicated that Upper Silesia had become the most important center of industrial planning undertaken by Germany. The Nazis' ambitions were aimed further than just the industrialization of Upper Silesia. The plan called for Upper Silesia to be the center of power of a large industrial region stretching from Yugoslavia to Russia.

More Associations Cancel 1945 Convention Plans

The Office of Defense Transportation last week announced it had received word from additional societies and organizations advising of the cancellation of projected conventions. The latest list of canceled conventions includes: National Association of Waste Material Dealers, scheduled for Chicago, March 19, 20 and 21; American Concrete Institute, New York city this month; Automotive Electric Association, manufacturers and distributors conference, Chicago, Feb. 5; the Chicago World Trade Conference, scheduled for Feb. 19; American Chemical Society, spring meeting; American Gear Manufacturers Association. Lists of other groups which have called off conventions were printed in the Jan. 22 and 29 issues of STEEL.

By-Product Coke Institute Organized in Illinois

Formation of the American By-Product Coke Institute under the laws of Illinois was announced last week. Headquarters will be established in Washington with Samuel Weiss as executive secretary. Mr. Weiss recently resigned as chief of the Fuel Section, Steel Division, War Production Board, and as chief of Coke Distribution of the Solid Fuels Administration for War.

Officers of the institute are: President, Leigh Willard, president, Interlake Iron Corp., Cleveland; vice president, William H. Earle, president, Philadelphia Coke Co., Philadelphia; treasurer, P. H. Neal, manager, coke and by-product sales, Alabama By-Products Corp., Birmingham, Ala.; secretary, Alfred Hirsh, vice president, Laclede Gas Light Co., St. Louis.

Dealers and Consumers Oppose Proposed WPB Scrap Zoning Plan

Register opposition at meetings to consider proposal which would confine consumers to drawing material only from specified areas. Move designed to curb cross-hauling. Restoration of $1 springboard to be sought

PROPOSED scrap zoning plan, which has been under consideration by the War Production Board in recent weeks, last week ran into opposition from scrap dealers, brokers and consumers at meetings in New York and Washington. It is understood 15 zones are proposed in the plan.

From authoritative sources it was learned that as things now stand the zoning plan has at least been temporarily shelved. The scrap industry now is expected to apply to the Office of Price Administration for reinstitution of the $1 freight springboard, discontinued some months ago, and which is favored by the trade on grades quoted on a delivered basis under the OPA formula.

The zoning plan as proposed by WPB aims at curtailing extensive cross-hauling. It would not disturb nearby sources of scrap for the various consuming districts but it would specify the exact territorial limits within which any consumer may purchase scrap.

To obtain scrap from areas outside his zone the consumer would have to get WPB approval. It is proposed under the plan to establish the zones in such localities that delivery of scrap to the consumers would be on a basis fairly comparable to that which prevailed under the original OPA $1 springboard formula. The zoning areas would be centered around each steel producing point. In some instances this would result in six or seven steel plants being forced to draw scrap from one zone.

If adopted, it is said, the plan would hinder the operations of many brokers and dealers who have established sources of scrap outside the particular district in which their customers are operating. For example, it is reported the states of Massachusetts, Rhode Island, New Hampshire, Vermont and Maine would no longer be a source of scrap supply for the Pittsburgh district. There are said to be a number of states in the South zoned to ship scrap to the Pittsburgh area which would take high freight rates and substantially increase present delivered scrap costs. The Cleveland, Detroit and Chicago districts also would no longer be a source of scrap for the Pittsburgh area.

The general contention of the scrap industry is that scrap is not measurable geographically from a production standpoint, especially under the constantly shifting sources of supply during wartime conditions. For example, the flow of scrap this winter has been disrupted at many points due to weather conditions and bogging down of rail transportation, necessitating the frequent purchase of scrap from a second originating point by many consumers. Greater flexibility in the purchase of scrap is thought necessary by both brokers and dealers alike.

Engineers Discuss Light Metals, Low Alloy Steels

What has been done with light metals, including low-alloy, high-strength steels and austenitic group of stainless, for increased application in strong, light weight construction, was reviewed at panel meetings sponsored by the Engineering Societies committee on war production, Jan. 30.

Attended by several hundred engineers, developments in steels and lighter nonferrous alloys were covered with stress on their postwar utilization.

An advantage of high-strength low-alloy steels is their fabrication in a rolled condition without further treatment, lighter weight and greater tensile strength, improved resistance to atmospheric corrosion and other physical properties over ordinary steel, said F. D. Foote, president, Alloys Development Co., New York.

Austenitic stainless steel, 18-8 and 17-7 types, attains strength in cold working and are increasingly employed for mechanical applications rather than for decorative when first brought out. Russell Franks, chief research metallurgist, Union Carbide & Carbon Research Laboratories, Niagara Falls, N. Y., said 18-8 was notably stable in attaining strength in cold working, retaining ductility.

Noting the general improvement in dimensional accuracy of the product, Donald J. Reese, chief, manufacture and foundry products section, metallurgical and conservation branch, steel division, WPB, stressed the great range in tensile strength of gray iron castings, indicating engineers are not always appreciative of this range for many applications.

T. L. Fritzlen, chief research metallurgist, Reynolds Research, Glen Cove, N. Y., said reflectivity of aluminum is an increasing factor in more applications, also electrical conductivity.

POSTWAR PREVIEWS

FARM IMPLEMENTS— History of steel consumption by the agricultural machinery industry in past years offers pattern for probable future use by this industry. See page 86.

MACHINE TOOLS— Sale of American-built tools originally delivered on lend-lease to Great Britain solves postwar disposal problem. See page 87.

RESEARCH— Continuing program of technological research for war in the postwar period advocated to keep America prepared. See page 92.

SEIZURES— Federal court's ruling in Montgomery Ward case seen as restating of constitutional guarantees on property rights not directly affecting war. May serve as check on government encroachments in postwar era. See page 94.

MINERALS— Senate Small Business Committee continues study of premium price plans to encourage mining of strategic materials. See page 94.

CHINA— Donald M. Nelson predicts China, with American help, may replace Japan as leading industrial nation of Orient after the war. See page 95.

WEST COAST— San Francisco and Oakland areas have "work-pile" of private enterprise projects aggregating $282 million. See page 105.

SUPER MACHINE TOOLS— Impressive record in man-hour and dollar savings is being rolled up by intricate multi-purpose machine tools with "built-in skills." Capacity and ease of operation insure continuing flow of aircraft parts. See page 114.

METAL MARKING— Refinements incorporated in latest equipment for marking metals signalize passing of comparably cruder and less efficient models. Pneumatic, hydraulic and electrical control and designs ranging from gang sheet printers to pantographic etchers with four needles supplement improved hand equipment. See page 121.

Technological Research for War Urged as Broad Continuing Program

House committee on postwar military policy told of need for creation of a permanent military research setup to enable nation to keep pace with scientific developments having a bearing on military matters

MANUFACTURERS and inventors should have less difficulty after this war in bringing new developments in military weapons to the attention of the Army and Navy than was the case prior to the war, if the plan recommended by Dr. Vannevar Bush, director of the Office of Scientific Research and Development, is adopted by Congress.

"We must not go back to either the organization or the philosophy which prevailed with regard to scientific research on military matters in the years between 1918 and 1939," Dr. Bush told the House Special Committee on Postwar Military Policy. While many admirable things were done by the Army and Navy in this period, the services were not organized to give adequate recognition to scientific potentialities as a phase of war. In addition to organizational difficulties, service personnel were not trained to appreciate the value of scientific research.

"The military and civilians, working together, are now fighting the technical aspect of this war in an effective partnership," he continued. "On the scientific front, on research and new weapons, things in general are now going well—remarkably so when we consider the great organizational handicaps under which we started this war, and which to some extent still persist."

Must Develop Superior Weapons

But after this war, said Dr. Bush, we must begin at once to prepare intelligently for the type of modern war which may confront us with great suddenness some time in the future. Such preparation, he said, means the development of weapons equal or superior to any that a potential enemy might bring to bear against us. To accomplish this objective, he said, it will not be sufficient merely to continue our present wartime organization into the period of peace.

"In the first place, no temporary expedients, effective as they may be, can outlast the emergency pressures which gave them being and vitality. In the second place, no temporary improvisation can be completely effective if the fundamental organization upon which it is superimposed is either weak or unsound," he said.

The trouble in the past, said Dr. Bush, was that military tradition called for planning in terms only of existing weapons. "The failure to have at the top levels of the military organization trained scientists and military leaders who plan in terms of future weapons or weapons in process of evolution may be costly in terms and lives and battles. In the future, the presence or absence of this type of planning at a high level may determine the entire course of war.

"Traditionally, advanced military thinking on the improvement of weapons and on new methods of combat has been left to the lower echelons, on the theory that any matter of sufficient importance will force itself up from below upon its own merits, and demand the attention it deserves. There is a basis for this argument. Yet, the course of modern war is so largely determined by the evolution of new techniques that it is absolutely essential that first-class thinking combine military considerations with the possibilities opened by technical progress.

"Lest it be thought that this is merely a matter or generalities, consider the three great technical innovations of the first World War, tanks, poison gas, and aircraft. All three produced effects on the course of the war, yet these were essentially temporary and local. If sufficient grasp and vision had been present to see possibilities at the outset and prepare for full-scale surprise use thoroughly followed up, there is little doubt that the war could have been shortened."

Our present military and naval organizations were built originally for comparatively static armament, and this was sufficient and desirable in the days of wooden ships, said Dr. Bush. Today our military techniques have outrun our organization for handling them.

"An item as humble as a flashlight, if designed for special operational use, may find itself the victim of overlapping jurisdictions and competing demands for control over both its development and procurement.

"Today, a single complex unit of offense or defense, such as a radar-controlled antiaircraft installation," he said, "may cut across many of the traditional branches of the military services. A complex weapon on the order of the German V-bombs, for example, might involve Chemical Warfare if it were an incendiary, Air Forces if it were borne by wings, Signal Corps if it involved control devices, Engineers if it needed emplacements for launching, and Ordnance. Similarly, a new type of incendiary bomb would involve both Chemical Warfare and the Air Forces. Each has a responsibility and each must be satisfied as to its own specifications, standards of safety and performance. No one branch sees the whole picture. No one branch can give overall direction.

Improve Position of Technicians

"This must be done from the top, and it can be done only if science and its applications have bulked large in the experience of the men at the top. Even this is not enough; the position of the technical man should be improved throughout the length and breadth of both the services. Men in responsible positions should have better technical training and, conversely, soundly trained technical men should be eligible for high command.

"Lastly, broad or complex programs of research and development should have a status at a staff level."

The service schools at West Point and Annapolis, said Dr. Bush, must bring new

DR. VANNEVAR BUSH

Director of the Office of Scientific Research and Development, Dr. Bush has contributed to the science of warfare in both World War I and World War II. During the first war, he served the Navy in working out submarine detection devices. During the early days of the preparedness program, he was chairman of National Defense Research Committee, later was named director of OSRD

The CONE AUTOMATIC MACHINE COMPANY *sees many* GOOD THINGS AHEAD

It is reported that . . . . . .

Through recent explorations our known reserves of bauxite (source of aluminum) have been increased by more than 100 million tons. *Science News Letter.*

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The National Postwar Products Exposition is scheduled to open March first at the Chicago Coliseum. *Marcus W. Hinson, Ex. Mgr. 1513 S. Wabash Ave., Chicago 5.*

get ready with CONE for tomorrow

A new tractor-drawn farm implement plows, discs and harrows in one operation. *"Till-Master", Till-Master Mfg. Co., Portland, Oregon.*

get ready with CONE for tomorrow

Today's scientists have revived a four-thousand year old method of killing insect pests with fine dusts. These dusts adhere to the insect's skin or casing and interfere with its water balance. Death results from thirst. *Dr. H. V. A. Briscoe, Imperial College, London.*

get ready with CONE for tomorrow

A railroad now has one-hundred plywood box cars and one thousand on order. The weight saving is said to be about two tons per car. *Great Northern Railway.*

get ready with CONE for tomorrow

A new "de-barker" is being used in some pulp mills that removes the bark from logs by the force of a jet of water at 650 pounds pressure without removing any wood. The saving in wood is said to be as high as 20%. *Scientific American, Oct. 1944.*

get ready with CONE for tomorrow

The continuous injection molding of plastics is made possible by a new machine. *Chrysler Corp.*

get ready with CONE for tomorrow

A new electric iron requires no cord but absorbs heat from an electrically heated and thermostatically controlled base. *Eureka Vacuum Cleaner Co., Detroit.*

Jet propulsion may be used to power sailplanes and gliders and, in miniature, for flying models. *McGraw-Hill Overseas' Digest.*

get ready with CONE for tomorrow

A university engineer has announced the discovery of a new type of concrete, useful for building construction, that is stronger than steel and lighter than aluminum. *Northwestern University.*

get ready with CONE for tomorrow

A new $1,800, four-room house will come directly off the assembly line on to a truck for delivery. *"Wingfoot Homes", Goodyear Tire and Rubber Co.*

get ready with CONE for tomorrow

A "zipper" fastening has been developed that is claimed to seal in liquids and gases. *B. F. Goodrich Co.*

It has been stated that the weight of aircraft engines has been reduced about 40% since the beginning of the war. *Aircraft Yearbook 1944.*

get ready with CONE for tomorrow

Manufacturers of the "jeep" plan to sell it to farmers and are reported to have ordered 25,000 bodies for this purpose. *Willys Overland.*

get ready with CONE for tomorrow

A machine has been patented for making barrels out of cardboard for packing butter, flour, sugar, chemicals, fruits, or small parts. *Everett Industries, Akron.*

get ready with CONE for tomorrow

Aviation and electrical engineers are collaborating on an electric drive for aircraft. This will, if practical, permit the location of engines in the fuselage and do away with nacelles in the wings. *Hughes Aircraft Co. and Westinghouse.*

get ready with CONE for tomorrow

One of the country's largest grocery chains is planning to ship fresh fruits and vegetables to its markets by airplane. *A & P.*

Here is performance that is definitely AHEAD

This part calls for extreme accuracy and yet requires wide forming cuts on a variety of diameters. In one position an attachment taps an inside thread 5/16"-18 while, at the same time, a die cuts an outside thread 5/8"-27. Produced on the 6 Spindle Conomatic at the rate of 12.5 seconds per part.

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14

methods and new subjects to their curricula.

"The services," he went on, "have not yet learned—as industry was forced to learn a long time ago—that it is fatal to place a research organization under the production department. In the services it is still the procurement divisions that maintain the research organization. The evils of this arrangement are many. Basically, research and procurement are incompatible. New developments are upsetting to procurement standards and procurement schedules. A procurement group is under the constant urge to regularize and standardize, particularly when funds are limited. Its primary function is to produce a sufficient supply of standard weapons for field use. Procurement units, therefore, are judged by production standards.

"Research, on the other hand, is the exploration of the unknown. It is speculative, uncertain. It cannot be standardized. It succeeds, moreover, in virtually direct proportion to its freedom from performance controls, production pressures and traditional approaches."

The organization supervising military research and development work should assure a genuine scientific interlinkage between the two services to be successful, said Dr. Bush. One person should have the responsibility and full power over the entire program so as to resolve differences that would be sure to arise between the officers of the two services. This arrangement also would eliminate unnecessary duplication of facilities and effort, although Dr. Bush contended that there should be parallel programs within the two services.

Dr. Bush favored formation of a Research Board for National Security under the management of the National Academy of Sciences to succeed the present Office of Scientific Research and Development when the present war comes to an end. This Research Board, he declared, should be a temporary agency to bridge the gap between termination of the OSRD and the eventual creation of a permanent military research setup by act of Congress. The permanent arrangement, he felt, can be better formulated after a decision has been reached on our postwar military organization, particularly on whether the Army and Navy are to be linked together under one command as has been proposed in some quarters.

12-Week Foundry Course Planned at Philadelphia

A free elementary foundry course, sponsored by the Engineering, Science and Management War Training program of the U.S. government, will be conducted at the University of Pennsylvania, Philadelphia, starting Feb. 7 and continuing through April 25 with one class each week.

The Philadelphia chapter, American Foundrymen's Association, is co-operating with the government in conducting the course.

Montgomery Ward Ruling Imperils Future of the War Labor Board

Federal Judge at Chicago holds President without power to seize retail establishments. Says only Congress, through proper enactment of laws, can compel obedience by disputants in labor controversies. Rules WLB orders are only advisory

FUTURE of the War Labor Board last week appeared to be hanging in the balance following decision by Judge Philip L. Sullivan of the Federal District Court at Chicago that the President was without authority to order Army seizure of retail properties of Montgomery Ward & Co.

Established after the outbreak of war to arbitrate industrial disputes and help administer the "hold-the-line" policy on wages and prices, the board has depended largely on the President's special wartime powers to enforce its orders.

If the Montgomery Ward decision is upheld in the United States Supreme Court, to which it surely will go, and if the WLB authority is not implemented by Congress, the board faces collapse.

Judge Sullivan's decision checking, at least temporarily, the President's power to order the seizure of plants was generally hailed as an expression of sound doctrine. "The constitutional guarantees that protect the sacred rights, liberty and property of American citizens, from the humblest to the most exalted, still remain inviolate," the judge stated.

His ruling was based on four principal points:

1. That the seizure powers of the President are limited by both the Constitution and by congressional authorization, except in immediate combat areas.

2. That orders of the WLB, on which the President acted in part, are purely advisory and not of force in themselves.

3. That Congress is the only governmental branch that, by proper enactment of laws, can compel obedience by disputants in a labor controversy.

JUDGE PHILIP L. SULLIVAN

4. That Montgomery Ward is engaged in merchandising and retail distribution of goods and not in production of wartime materials.

Pending hearing on the Ward case by higher courts, the Army continued in control of the properties.

In addition to the Ward stores, the government is operating plants under eight other seizures. These include: Hummer Mfg. Co., Springfield, Ill., a subsidiary of Montgomery Ward; Mid-West Operators Association of 90 trucking companies; 104 San Francisco machine shops; 69 bituminous coal mines; Hughes Tool Co., Houston, Tex.; Twentieth Century Brass Works Inc., Minneapolis; Farrell Cheek Steel Co., Sandusky, O.; Cudahy Bros. Co., Cudahy, Wis.

Major Postwar Problems That Will Face Mining Industry Discussed in Report

MAJOR problems which will confront the mining industry of the United States as the war pressure for strategic ores and metals has subsided and peacetime production levels are resumed are considered in a subcommittee report by the Senate Committee on Small Business.

Foremost among these problems is what to do about the premium price plan, which will expire on July 31, 1945. The Senate Small Business Committee, through its Subcommittee on Mining and Minerals Industry, the membership of which consists of Sen. James G. Scrugham of Nevada, chairman, and Sen. C. Douglass Buck of Delaware, has conducted an unremitting fight for continuation of the plan on its existing basis.

Senator Scrugham explained that the report outlines "in an impartial fashion the various plans which have been proposed for securing a prosperous future for our domestic nonferrous and nonmetallic mining industry."

The report touches on maintenance of national stockpiles of metals and minerals for future security of the country, and observes that considerable controversy has risen from experiences that have come from both World Wars I and II.

Bright Future for China Envisioned

Ex-WPB chief predicts country will become leading industrial power in Orient after the war, provided America lends aid. Says total war output will be doubled by spring

Donald M. Nelson, former chairman of the War Production Board, inspects a scroll signed by Generalissimo Chiang Kai-Shek, officially appointing Mr. Nelson as high economic advisor to the National Government

CHINA'S economic war effort now is co-ordinated for the first time and "in addition to the improvement in the military situation, we can look for far-reaching gains on the economic front" as the result of action taken last autumn, President Roosevelt has been informed by Donald M. Nelson, former chairman of the War Production Board who left that position to organize a "Little WPB" in China.

Mr. Nelson's report dealt with steps taken to check the Japanese advance, the establishment of the Chinese WPB, allocation of additional transportation equipment to China, American technical assistance in the country's war production, and improvement in Chinese morale.

The former WPB chieftain was accompanied to the Orient by a mission of five experts in steel production and one technician in alcohol production. These experts studied Chinese production methods and are working with native plant managers and government officials with a view to increasing output, improving quality and reducing costs.

Mr. Nelson said Chinese banks are co-operating in the war production program by reducing interest rates to less than half the customary rate and cutting the time for negotiating loans from four or five months to a few days.

By the spring of 1945, Mr. Nelson predicted, Chinese war production will be double the November, 1944, rate.

"Increased and co-ordinated production plus improved transportation will make itself felt in an accession of strength to the entire Chinese economy," Mr. Nelson stated. "Better distribution of regional and local production and less scarcity of manufactured products will be forces operating to check the inflation. Over a period of time technological improvements in the expanding economy will mean greater productivity of industrial workers, higher real wage levels, larger purchasing power and tax returns, and more government funds.

"The success of China's venture in planned war production, if properly followed up through American government and business channels, will make for close postwar economic relations between China and the United States. China has the capacity and desire to develop herself industrially with American aid. If that aid is realistically planned, and if financial arrangements are put on a sound business basis, China should soon after the war begin to replace Japan as the leading industrial nation of the Orient. In that event, a market of enormous size should progressively open up for American export industries. I believe, too, that with American guidance China's development can be turned into peaceful and democratic channels, eliminating much of the fear of war which has for so long shaped the political attitudes in the Orient and the South Pacific."

"Here, in China, our job is to help this great, but militarily weak, nation on its feet," wrote Herbert W. Graham, director of metallurgy and research for Jones & Laughlin Steel Corp., at Christmas time. Mr. Graham heads the Steel Division of the Chinese War Production Board which has been studying conditions in China for some weeks. Shown in the picture are, left to right, standing: James A. Jacobson, assistant to Donald Nelson; E. M. Stallings, technical expert in alcohol production, WPB; Howard Coonley, deputy to Mr. Nelson; Mr. Graham; E. K. Waldschmidt, cold finished sales department, Jones & Laughlin Steel Corp.; Francis J. Cleary, secretary, Foreign Economic Administration. Seated, from left to right: C. A. Bell, foundry superintendent, United Engineering & Foundry Co.; H. A. Strain, director of raw materials, fuel and tar, United States Steel Corp.; Henrik Ovesen, consulting engineer, Lukens Steel Co.

New Five-Point WPB Program Designed To Increase Output

Subcontracts for class A products involving $100,000 or more and all prime contracts, requiring manpower in excess of WMC's ceiling, must get approval of production urgency committee if placed in group I areas. CMP regulation No. 10 issued

J. A. KRUG, chairman, War Production Board, has announced a 5-point program, designed to increase war production. It has been approved by the Army, Navy and other government procurement agencies as well as by the War Manpower Commission. Under the plan:

(1) All prime contracts requiring additional labor over the producer's current WMC ceiling will be subject to approval by a production urgency committee before they can be placed in a locality designated as group I labor area by WMC; (2) all subcontracts for class A products, involving $100,000 or more and requiring additional labor over the current WMC ceiling, will be subject to PUC approval before they can be placed in a locality designated as a group I labor area; (3) no spot authorizations will be made in any group II labor areas unless they are unanimously approved by the PUC concerned; (4) restrictions on construction will be strengthened; (5) full support will continue to be given to WMC's employment ceiling program, which went into operation July 1, 1944.

PUC Must Approve Contracts

Procurement officers in all group I labor areas will report all contracts of $100,000 or more (including renewals) to the appropriate PUC as far in advance of placement as possible, but at least seven days before placement unless this will unduly delay production. In cases where production might be delayed, the procurement officer will report to the committee as soon as is practicable before placement.

Approval of production urgency committees will be required for placement of prime contracts, regardless of dollar value, only in instances where the producer will require an increase in labor above the WMC ceilings.

Rules relating to subcontracts are contained in a new Controlled Materials Plan regulation No. 10. This regulation supplements controls on class A products that are exercised by the Army, Navy and other procurement agencies over the placement of contracts. Under this regulation, effective Feb. 12, a manufacturer may not accept an order for class A products (other than certain specified categories) for more than $100,000 to be made in any area that is classified as a group I labor area, if he will require manpower in excess of his existing WMC ceiling unless he has received approval from the WPB on form GA-2260 for acceptance of such an order.

Application for permission to accept purchase orders in group I labor areas in excess of $100,000 will be acted upon by WPB's local production urgency committees. In order to have a PUC act on an application, the person receiving such an order must file the following information by letter in triplicate with the local district office of WPB in the district where the product will be made:

(1) Description of the amount of the order, the proposed schedule of deliveries against the order, and a brief identification of the class A product or products covered by the order; (2) name and address of the customer and such information as is available (without requesting further information from the customer) regarding the end use of the product; (3) specific statement as to how much manpower will be required in excess of applicable WMC ceiling in each month in order to fill the order (together with all other orders already accepted).

This new procedure applies to all contracts, purchase orders, "releases," delivery orders, increases or accelerations of production or delivery schedules, or other requests from a customer for delivery either in larger quantities or at earlier dates than previous schedules called for, all except specific instances.

These instances are: (1) Class A products that are treated as class B products; (2) orders that are to be filled subject to a directive or special instructions issued by WPB; and (3) orders for class A products placed directly by the Army, Navy, Maritime Commission or Procurement Division of the Treasury Department.

Provision Made for Relief

Manufacturers who are unable because of the new CMP regulation No. 10 to place their purchase orders with competent suppliers may apply for relief. If the product is required for incorporation in another class A product manufactured on a contract of the Army, Navy or Maritime Commission, application for relief should be directed to the service concerned. If the class A product is for inclusion in a class B product, application for relief should be made to the appropriate WPB industry division. In all applications, the person seeking to place his orders should indicate the name and location of all companies with which he has tried to place it.

The new regulation specifically prohibits a manufacturer from splitting orders for class A products covered by it in order to evade the restrictions it imposes on order placement.

Rules relating to spot authorizations in group II labor areas is an extension of the agreement that was announced by the Army, Navy, WMC, and WPB on Dec. 1, 1944. At that time, it was announced that spot authorizations would not be made in any group I area and in certain group II areas without the unanimous approval of the PUC of the particular locality involved.

WPB Aids Manufacturers Of Communication Wire

War Production Board has taken steps to solve communication wire manufacturers' problems, including shortages of manpower, components, (including 0.013-inch galvanized wire) and facilities for stranding, compounding insulation, insulating and testing.

Quotas of field and assault wires have been established through June for each manufacturer with the understanding the manufacturers will be supplied the necessary materials, labor and machinery, or outside capacity.

An AA-1 priority rating has been granted to provide the necessary equipment for increasing production capacity of field and assault wire. Because of the tight supply of high-carbon steel wire, manufacturers now are permitted to make one of four steel strands of field wire conductors out of low-carbon galvanized steel wire.

The Steel Division, WPB, has established load directives on the mills for sufficient 0.013-inch steel wire to meet the field wire manufacturers' quotas. Stranding machines are being added, but projects in process are as yet insufficient to meet increased production schedules for field and assault wire. All types of critical communication wire are on the production urgency list for labor.

Appointments-Resignations

Appointments of Frank L. McNamee, Philadelphia, as deputy chairman and Robert C. Goodwin, Cleveland, as executive director, have been announced by the War Manpower Commission. They succeed the late Charles M. Hay who held both posts.

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Collis Stocking has been appointed assistant director of the War Manpower Commission in charge of program development. He succeeds William Haber, who resigned recently to accept a position with the Office of War Mobilization and Reconversion as director of the Division of Manpower Liaison and Co-ordination.

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L. J. Chatten has been appointed director of the Radio and Radar Division, WPB, succeeding Ray Ellis who has returned to General Motors Corp. in New York city.

PRIORITIES–ALLOCATIONS–PRICES

Weekly summaries of orders and regulations, together with official interpretations and directives issued by War Production Board and Office of Price Administration

INSTRUCTIONS

STEEL DRUMS: Time limit on direction 2 to order L-197 has been extended to March 31, permitting delivery of new steel drums for packing of specified food products. Packers of schedule A items may use in the first quarter of 1945 quotas equivalent to those they were entitled to use in the fourth quarter of 1944, in lieu of quotas based on the first quarter of 1943.

TIN: All outstanding authorizations for use of tin that existed prior to Sept. 1, 1944, have been canceled. On Dec. 30, 1944, sale of jewelry containing tin was stopped, effective March 1, 1945.

HEATERS: Delivery of unit heaters for extended surface heating now are limited to orders with ratings of AA-2X until April 16, 1945. After that date, sales will be limited to orders rated AA-5 or better, as provided in order L-107.

ALUMINUM: Allotments of aluminum made by the Aircraft Scheduling Unit of Aircraft Resources Control Office now are being made in terms of specific forms and shapes rather than merely in terms of "aluminum." Persons who receive allotments of aluminum forms and shapes from ASU must in turn make their allotments of the metal in terms of specific forms and shapes. This action is contained in direction No. 56 to CMP regulation No. 1.

CMP REGULATION

CLASS B PRODUCTS: Manufacturers who are behind schedule in making class B products under Controlled Materials Plan procedures may not make up such deficiencies in any but the succeeding quarter for which such production has been authorized, and then only up to 10 per cent of the total production authorized. Controlled materials that are not needed for the production schedule for which they were originally acquired now may be used on any other production schedule in the same plant or operating unit if such schedule is authorized in terms of units or dollars. Materials obtained under CMP allotment that are not needed for the purpose for which originally acquired may be used for any purpose for which the manufacturer is entitled to use a blanket symbol (such as MRO), but in this instance, the amount of materials used must be charged against the permitted quota limiting the use of the blanket symbol. (CMP No. 1)

E ORDER

MACHINE TOOLS: Machine tool builders now must first meet required delivery dates on rated orders before scheduling any unrated orders. This will tend to increase the flow of the equipment to war requirements. (E-1-b)

L- ORDERS

MOTOR TRUCKS, TRAILERS: Control of the transfer, conversion or diversion of used fluid-food tank trucks, tank trailers and tank tractors has been transferred to the Office of Defense Transportation from the War Production Board. Order ODT-48, replacing order L-1-j, revoked, prohibits transfer or acceptance of transfer of fluid food motor tank vehicles without prior approval of the ODT. ODT approval also is required for dismantling, converting, remodeling, or for other alterations or for diverting or removing any such vehicle from the service or territory in which it is used. (L-1-j)

ELECTRIC IRONS: Veterans' Administration has been added to the list of government agencies entitled to place preferred orders for electric irons. Only manufacturers who have been assigned production quotas may fill orders for the Army, Navy, Maritime Commission, Veterans' Administration and War Shipping Administration. In applying for production quotas, manufacturers file WPB-3700 and WPB-3820 with WPB field offices. Use of form WPB-3550.1 has been discontinued. Production in excess of approved WPB programs may be authorized under the "spot authorization" procedure. (L-65-a)

ELECTRIC FANS: Veterans' Administration has been added to the list of government agencies entitled to place preferred orders for electric fans. Manufacturers may fill Army, Navy, Maritime Commission, Veterans' Administration and War Shipping Administration orders, as authorized on form WPB-1319. In applying for production quotas, manufacturers file forms WPB-3700 and WPB-3820 with WPB field offices. Production in excess of approved WPB programs may be authorized under priorities regulation No. 25. (L-176)

TRUCK AND TRAILER BODIES: Special limitations on the use of iron and steel in truck and trailer bodies have been removed through revocation of the controlling order. (L-253)

WELDING EQUIPMENT: With certain exceptions, only ratings assigned by WPB in Washington on form WPB-1319 will permit purchase of new resistance welding equipment. However, any form WPB-1319 that has been issued or will be issued automatically takes an AA-5 rating if it specifically authorizes purchase. (L-298)

INDEX OF ORDER REVISIONS

Subject	Designations
Bismuth Chemicals	M-295, 300
Civilian Production	PR No. 24
Class B Products	CMP No. 1
Fans, Electric	L-176
Irons, Electric	L-65-a
Lead Chemicals	M-384
Machine Tools	E-1-b
Motor Trucks and Trailers	L-1-j
Silver	M-199
Truck, Trailer Bodies	M-126, L-253
Welding Equipment	L-298
Price Regulation	
Rifles and Shotguns	No. 254

M ORDERS

TRUCK AND TRAILER BODIES: Use of stainless steel is now prohibited in truck and trailer bodies except in milk trucks and refrigerator type trucks. Iron and steel available, other than stainless steel and galvanized sheets, for truck and trailer bodies, will be subject to the regular CMP allotments by WPB's requirements committee. (M-126)

SILVER: Distinction between the use of Treasury "free" silver and domestic silver have been removed. (M-199)

BISMUTH CHEMICALS: Control of bismuth chemicals has been transferred to order M-300 from order M-295 which has been revoked. Applications on form WPB-2945 for authorization to purchase and use bismuth chemicals have been eliminated. Purchasers of more than 25 pounds of any bismuth chemicals in any month must send certificates of use to their suppliers. (M-295, 300)

LEAD CHEMICALS: Amount of lead that may be used in manufacture of specific chemicals is now restricted under order M-384 which also controls the civilian use of such chemicals. No person shall put into process in any calender quarter for the production of basic carbonate of white lead more than 15 per cent of the amount used for this purpose in 1944. Use of white lead in production of paints, varnishes and lacquers for civilian uses is limited in any quarter to 8 per cent of such use in first six months of 1944, or 1000 pounds, whichever is greater.

Quarterly use of red lead for civilian purposes is limited to 30 per cent of such use in first six months of 1944, or 1000 pounds, whichever is greater. Production and use of lead chrome pigments are not limited by this order but are controlled by order M-370, which provides a quarterly quota of 6.25 per cent of 1941 purchases for civilian use. Restrictions have been placed on the lead content to be used per quarter for specified products. (M-384)

PRIORITIES REGULATIONS

CIVILIAN PRODUCTION: Provisions of priorities regulation No. 24 that had permitted the placement of unrated or nonauthorized orders for certain types of capital goods and other equipment have been rendered inoperative. Items covered by WPB orders that have been deleted from the list A for which unrated and nonauthorized purchase orders already have been placed and which have not been actually shipped may not be delivered unless proper rating or authorization is obtained or unless the particular WPB order is amended to allow such delivery. Unrated or nonauthorized purchase orders for items affected by this amendment may be retained on purchasers' books, but must be treated as orders sheduled for delivery when applicable restrictions are modified to permit delivery.

Manufacturers who are now producing or have planned to produce on unrated or nonauthorized purchase orders under provisions of priorities regulation No. 24 will be expected to cut back any purchase orders they have placed for components, parts, and materials to conform to applicable WPB inventory regulations.

Provisions of the regulation that permit applications for preference ratings on form WPB-1319 for equipment and machinery needed for civilian production or performance of civilian services are not affected by the amendment.

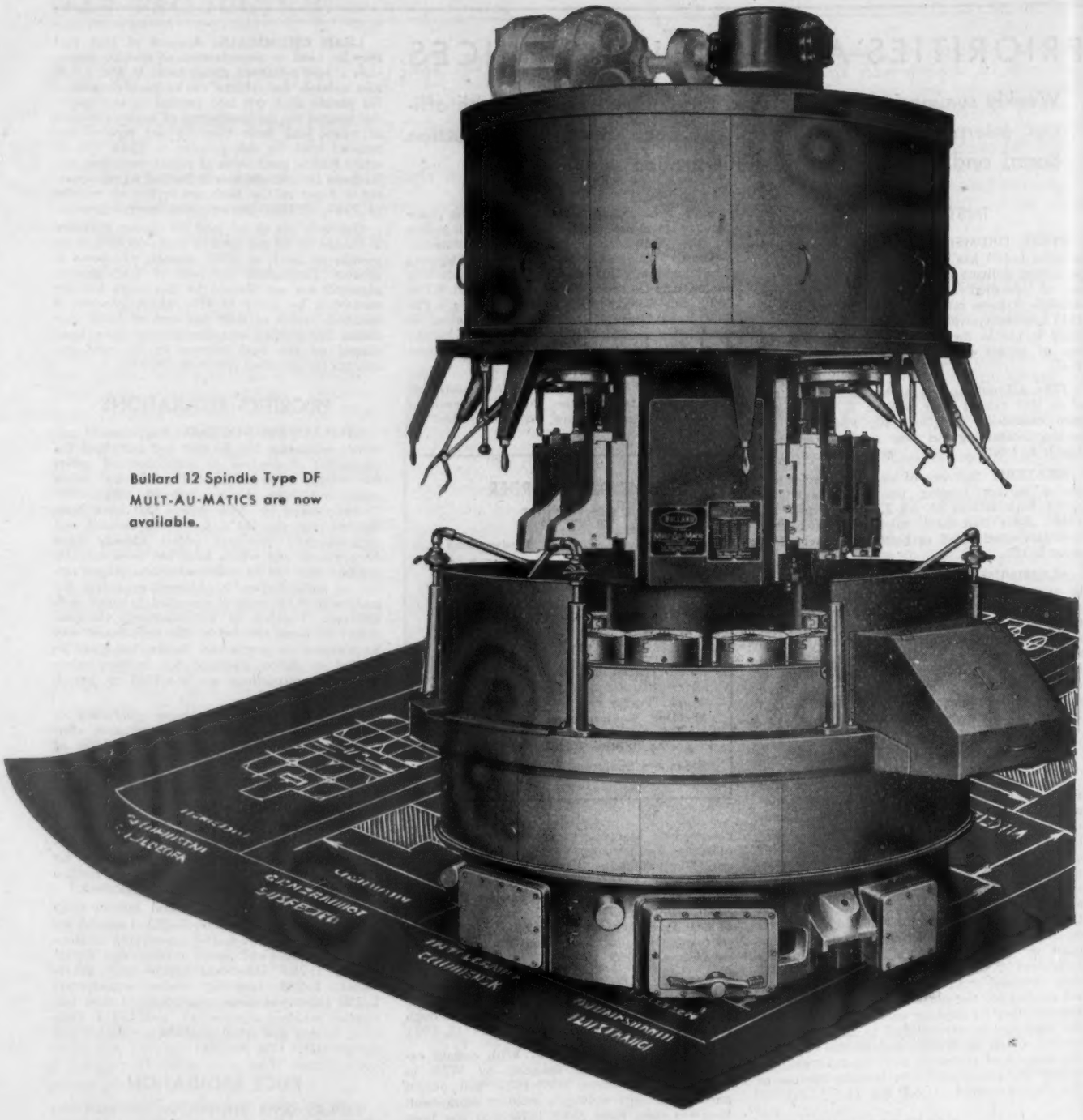
Orders affected by this action follow: L-89 (elevators and escalators), L-125 (general industrial equipment), L-193 (conveying machinery and mechanical power transmission equipment), L-221 (electrical motors and generators), L-226 (printing trades machinery), L-250 (electrical motor controllers), L-298 (resistance welding equipment), and L-311 (logging, lumber and wood products machinery and equipment), (PR No. 24)

PRICE REGULATION

RIFLES AND SHOTGUNS: Manufacturers of rifles have been granted an increase of 8 per cent above previous ceilings, of which wholesalers will absorb 2.65 per cent, and retailer, 3.15 per cent; and an increase of 9 per cent on shotguns, wholesalers absorbing 2.46 per cent and retailer, 2.84 per cent. (No. 254)

Cadmium Requirements Gain As Production Declines

Increased Army requirements will keep cadmium high on the list of critical metals throughout 1945, officials of the War Production Board revealed recently. Estimated 1945 requirements for the metal, used principally for plating, are up 5 per cent over 1944 needs, while indicated 1945 production will show a drop of more than 10 per cent from last year's level. Overall cadmium stocks declined about 25 per cent from the inventories on hand at the start of 1944.



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Twin Tooling Doubles Production With Investment Up Only Slightly

On work up to 8" in diameter and 10½" in height, you can now produce two finished pieces in the time of the longest single boring, turning, facing, threading, grooving or drilling operation plus a few seconds for indexing.

Twin spindles at each of the six or eight stations and twin tooling on the head of each working station mean that you double the ordinary MULT-AU-MATIC production output for its size of work.

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BULLARD

CREATES *NEW METHODS*

TO MAKE MACHINES DO MORE

By A. H. ALLEN Detroit Editor, STEEL

MIRRORS of MOTORDOM

Cab operators expect new taxis to be manufactured by Packard. Official confirmation is lacking. Fifteen hundred companies in Detroit district engaged in $150 million rocket contracts. Year's truck requirements heavier than in 1944

DETROIT

ANNOUNCED plan to attempt to obtain approval for the early production of a quantity of taxicabs at Packard here already has percolated down to the level of taxicab owners, and one operator of a group of cabs who was planning investment of several thousand dollars for complete overhaul of a number of his vehicles changed his mind after being informed some new Packard cabs would be available before too long at a reported price of $900. No word has come from the company either with respect to any early manufacturing program or to selling price, and hence the reports must be classed as conjectural.

But where there is smoke there may be assumed to be fire, so it would not be surprising to see activity in the near future. At the start, bodies would have to come from Briggs which several months ago stated it was readying several plants for a quick reconversion to body production. Briggs Vernor plant formerly supplied a portion of Packard body requirements and likely would be the source of taxicab bodies. At present the plant is busy on a large order of ambulance bodies for Dodge, but with line production fairly well established, it might be possible to work in some cab units along with the ambulances. Admittedly it would be uneconomical and difficult, but if the demands were pressing enough, it probably could be done.

New Cabs Would Save Manpower

The reasoning is that taxicabs and buses constitute essential transportation for the maintenance of the civilian economy. While cabs now in service can be repaired, they have deteriorated to the point where more manpower is required to service them than would be required to build new units; hence it is only common sense to follow the latter course. Unfortunately, common sense does not always dictate Washington policies and as yet there has been no official sanction placed on taxicab manufacture. Approval has been granted for a limited number of civilian buses and these are now in production.

Engines, transmissions, rear axles, springs, radiators, frames and wheels are components which Packard would have to line up to round out a taxicab program. With replacement engine manufacture now under way, a supply of 6-cylinder Packard engines doubtless could be arranged. Transmissions and rear axles would be difficult items, but might be siphoned off Army truck requirements in sufficient degree to avoid interference with military needs. Seats and upholstery would be other essential items, but suppliers have stated that, given government approval, they would be forthcoming without too much delay.

The general tightening up of military requirements which went into effect following the setback in Belgium has been felt all along the manufacturing line, but the feeling persists in some circles it was mainly a psychological move and could not have been dictated by any general shortages in Army and Navy equipment, since there were no apparent losses at the front of a magnitude which would require increases in production of all categories of equipment. True, the Germans may have captured stores at a number of advanced depots, but these represented only a small fraction of the total tonnage of material moved to the European theater. Cablegrams to war workers from Maj. Gen. L. H. Campbell, chief of ordnance, blown up to poster size and affixed to bulletin boards in all war plants, can be calculated to have a beneficial effect on employe morale, but they certainly cannot be taken as reflecting urgent battlefront demands. There are quicker ways to arrange for emergency production increases than by the use of posters to influence employes.

Bearing on this question is the recent about-face which the local ordnance district chief found necessary. In a statement to newspapers, he had inferentially chided workers building tanks at the Cadillac and Chrysler plants here. Immediately a storm of protest arose within the plants and among union leaders. Quickly General Quinton released a revised statement in which he declared his original admonitions had been misunderstood. Telegrams were dispatched to the plants involved, the following being received at Chrysler:

"This is to advise all employes of Chrysler Corp. and the Army Ordnance Department working on tanks in Chrysler Corp. and Chrysler operated ordnance plants that everything possible is being done to alleviate any holdups as a result of transportation difficulties due to the extremely cold weather. Do not think that because possibly some tanks may not be going out as rapidly as usual that we need them any the less. Every message we receive from the front indicates that the need for your tanks was never greater. As you know, the men and women of Chrysler Corp. and the Detroit tank arsenal are one of the principal suppliers of medium tanks. From the time you became the nation's largest producer of these tanks, your production achievements have been outstanding and your ever-growing schedules have been constantly met. Congratulations to all of you on the good job you have done, and I feel sure that you realize how seriously we continue to need your products in the future. Please do everything you can to keep up the excel-

INSPECTS ROCKETS: O. W. Franke, general works manager of the Dodge Main plant in Detroit, inspects nose sections for rockets, which are produced in quantity by the Dodge Division of Chrysler Corp. Up to Jan. 1, the company had manufactured 150,000 rockets, 4½-inch diameter and 32½ inches long

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lent production work that you have been doing."

Tanks were only one item that began piling up in this area as a result of the rail freight traffic embargo, and a considerable amount of shifting in plant schedules was necessary in view of the sudden emergency. The situation was mildly suggestive of what will happen when military production schedules feel the impact of a possible sudden German surrender.

An idea of the extent of the Navy's rocket procurement program in this area is suggested by a recent release from the local Navy public relations bureau which states 800 companies in Detroit and 1500 in the Detroit district (Michigan, Indiana and part of Ohio) are engaged on $150 million worth of rocket contracts channeled into this district. Seventeen of the companies are prime contractors: Westinghouse naval ordnance plant, Pontiac Motor Division, Barnum Bros. Fiber Co. Inc., Firestone Steel Products Inc., Kelsey-Hayes Wheel Co., McCord Corp., Monroe Auto Equipment Co., Nash-Kelvinator Corp., Parsons Co., Traverse City; Reo Motors Inc., Lansing; Durham Mfg. Co., Fort Wayne, Ind.; Magnavox Co., Fort Wayne; McInerney Spring & Wire Co., Grand Rapids; Felters Co. Inc., Jackson; New Products Corp., Benton Harbor; Motor Wheel Corp., Lansing, and Ohio Art Co., Bryan, O.

Thirteen of the prime contractors are alleged by the Navy to be behind schedule, due primarily to lack of tools; this in face of the fact many of the medium and small size tool, die, jig and fixture shops in the district are begging for work.

The year's civilian and military requirements for trucks will be even greater than total 1944 production, say the WPB and the armed forces. Tentative schedules for 1945 call for production of 869,212 trucks of all types, comparing with 1944 production of 743,750, excluding half-tracs and armored cars. Breakdown is as follows:

	1944 Output	1945 Schedule
Light trucks	247,113	296,985
Medium trucks	175,370	184,436
Light-heavy trucks ..	256,185	322,734
Heavy-heavy trucks..	65,082	65,057

These figures, together with corollary comment, were furnished to the WPB's new heavy truck labor advisory committee which in turn presented observations on the subject of heavy truck production, including the following:

1. No manpower shortage exists in assembly plants, but a severe manpower shortage, particularly unskilled workmen, does exist in foundries and forge shops producing basic components.

2. Among obstacles interfering with production are layoffs, temporary shutdowns and poor utilization of manpower, as well as absenteeism.

3. Plants achieving maximum truck production are those in which good relations prevail between management and labor.

4. Greatest heavy truck output will require steps such as full utilization of existing plant facilities, no idle machines in factories in which workers are waiting around for work, use of subcontractors to supplement home plant facilities—not to take their place, a 7-day week in critical departments, no usable foundry kept idle for want of contracts, better planning and early placement of orders with suppliers, checking of plants which are holding back war production in favor of production for postwar, elimination of retiming of jobs at the expense of workers when they speed up production, urging management to aim at maximum rather than minimum figures, clear-cut information to workers regarding schedules that have to be met.

It must be remembered these are the recommendations of the labor advisory committee which is made up of a dozen or so UAW-CIO and UAW-AFL workmen from the principal truck manufacturing plants. Their views follow the familiar union line, throwing all the blame on management and absolving the workman from all responsibility. Little is accomplished by skyrocketing such charges under semiofficial guise, except to stir up more animosity and waste more time.

AID TO CHINESE: Latest United States Army contribution to the Chinese offensive against the Japanese on the Salween front is a number of General Motors 2½-ton ordnance machine shop mobile trucks. Shown in the photo above is Maj. Harold H. Morse, Kansas City, Kans., showing Maj. Gen. Siu Ho, commanding general of Chinese ordnance, equipment in the shop truck, which includes a bench shaper, lathe, drill press, bench grinder, portable electric drills and a 5-kw generator set. Signal Corps photo

Union Opens Health Institute

The UAW-CIO has opened a new Health Institute in the three-story Italian Renaissance home formerly belonging to Edsel Ford on East Jefferson and purchased by the union last April. It provides 5000 feet of office space, five examination rooms, laboratory, X-ray department and library. Staff, under direction of Dr. Morris Raskin, will provide individual and group examinations, and will seek to develop health education programs and to establish health and safety committees in all union locals.

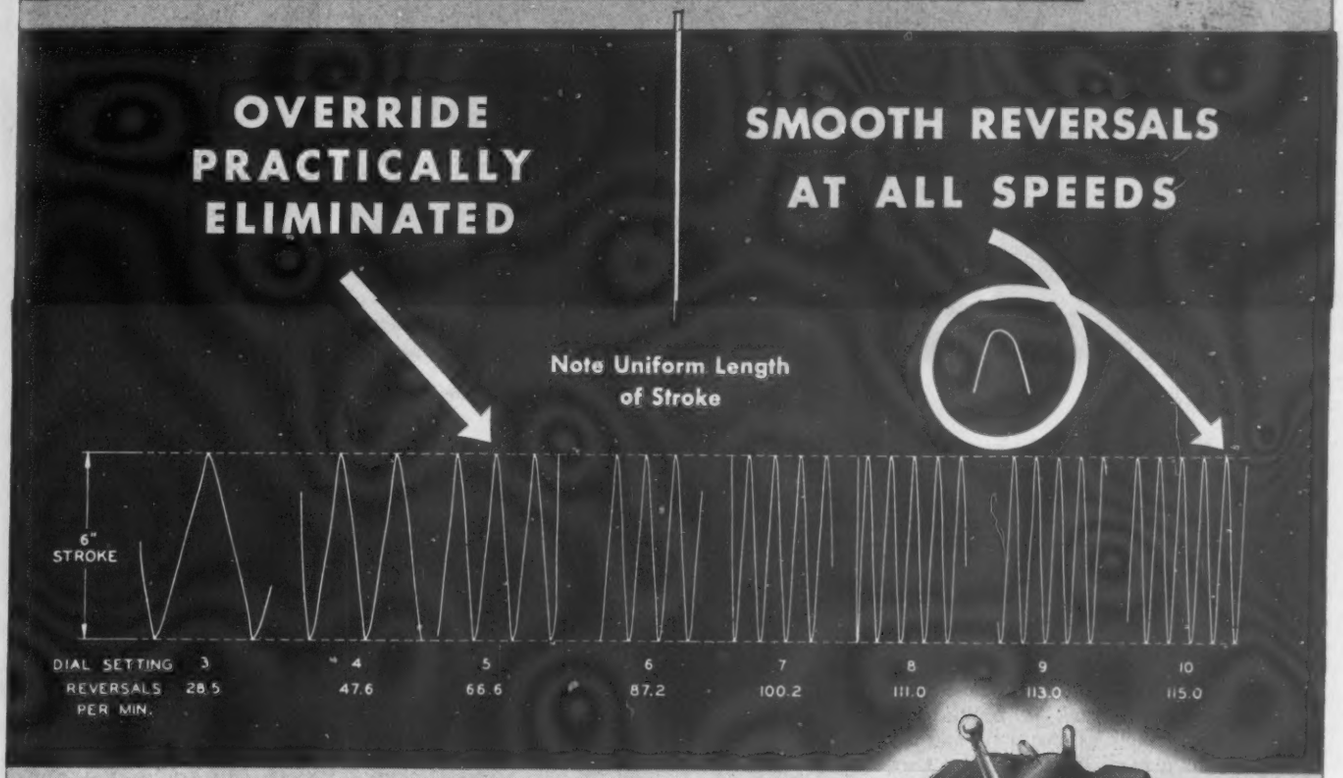
Queried on a radio roundtable as to his sentiments on postwar car prices, Ward M. Canaday, chairman of Willys-Overland Motors Inc., Toledo, O., replied that new postwar cars of the same dimensions, weight and power, in the beginning, will cost more, reflecting increased wages and increased costs of materials. Average weekly wage in the industry is up 43 per cent from 1941 and the average hourly wage at regular time is up 22.6 per cent, increases which are also reflected in materials. He added new cars will also reflect the higher overhead of smaller volume but that as opportunities develop for using new and lighter materials, lighter power units and improved methods, costs should go down. Generally speaking, he believed the standard of performance and comfort of the postwar automobile will bear about the same relation to the postwar pocketbook that it did before the war.

He also foresaw an increase of three or four million in overall employment of the automotive highway transportation industry, from the prewar level of 6,700,000, along with a possible eight years of 6,000,000-car per year production. As for the jeep, Mr. Canaday with pardonable pride observed it supplies a "crying need worldwide for a power plant that can be used universally, whose real work begins where the paved road ends."

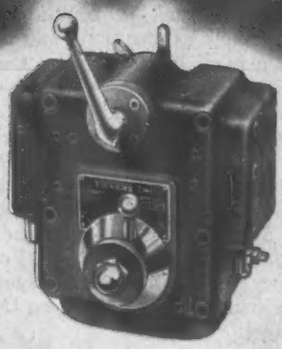
For Machines Requiring Continuous Reciprocating Cycles:

OVERRIDE PRACTICALLY ELIMINATED

SMOOTH REVERSALS AT ALL SPEEDS



VICKERS "RECIPROCATING CYCLE" CONTROL PANELS



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MEN of INDUSTRY

R. E. FRITSCH

FRANK W. SMITH

C. O. KLEINSMITH

D. B. JOY

R. E. Fritsch, since 1929 vice president of Tube-Turns Inc., Louisville, Ky., has been elected president, succeeding Walter H. Girdler Sr., who died Jan. 7. Mr. Fritsch continues as vice president and director of Girdler Corp., Louisville, an affiliate of Tube-Turns.

—o—

Norton Co., Worcester, Mass., has announced appointment of three additional vice presidents, **Milton P. Higgins, Ralph M. Johnson** and **Frank W. Smith.** Mr. Higgins continues as treasurer, and Mr. Johnson as general sales manager, Abrasive Division. Mr. Smith becomes manager of the Grinding Machine Division, succeeding **Howard W. Dunbar,** vice president, who will continue to serve the company in an executive capacity. Other changes in the Grinding Machine Division are: **Albert G. Belden,** manager of research and engineering; **Iver G. Freeman,** factory manager; **Roger Magoun,** production manager, and **C. Denson Day,** sales manager.

—o—

John D. Kershaw Jr. has been made field engineer for Hanson-Van Winkle-Munning Co., Matawan, N. J. Until recently Mr. Kershaw was supervisor of plating, Aviation Division, Studebaker Corp., South Bend, Ind.

—o—

Louis Carlton Sabin, vice president of the Lake Carriers' Association, has been made an honorary member of the American Society of Civil Engineers in recognition of outstanding accomplishments as the leading engineering authority on the Great Lakes.

—o—

J. Walter Dietz, industrial relations manager of the manufacturing department, Western Electric Co., New York, has retired after more than 42 years of service. Mr. Dietz has been on leave of absence for the past four years, serving with the War Manpower Commission, Washington. He will continue with WMC.

—o—

Andrew D. Palmer has been appointed assistant manager of general advertising in the public relations department, Westinghouse Electric & Mfg. Co., East Pittsburgh, Pa. Mr. Palmer will be responsible for all youth advertising programs and will direct promotional activities of the Rural Electrification Section.

—o—

C. O. Kleinsmith has been elected a vice president, National Carbon Co. Inc., unit of Union Carbide & Carbon Corp., New York, and **D. B. Joy** has been named general sales manager for carbon products. **R. P. Bergan** becomes general sales manager for the company's consumer and related products.

—o—

Ralph Evinrude has been elected president, Outboard, Marine & Mfg. Co., Waukegan, Ill., and **S. F. Briggs** has been elected board chairman. Officers chosen include: **J. Stern,** executive vice president; **Hugo Biersach, W. C. Clausen, F. T. Irgens, E. H. Millet, J. G. Rayniak** and **P. A. Tanner,** vice president; and **H. M. Fisher,** secretary and treasurer.

—o—

William Kelly of American Brake Shoe Co., New York, has resigned chairmanship of the OPA Advisory Committee for Iron and Steel Scrap, and has been appointed executive vice president of his company's Kellog Division, Rochester, N. Y.

—o—

Robert J. Quinn, assistant to the vice president-director of sales, Mathieson Alkali Works, New York, has been elected president of the Compressed Gas Manufacturers' Association Inc. **Clarence McL. Pitts,** president, People's Gas Supply Co., Ottawa, is first vice president of the association, and **C. G. Andrew,** director of engineering and gas plants, Air Reduction Co., New York, is second vice president.

—o—

Robinson Ord is serving as acting general manager of sales, Organic Chemicals Division, Monsanto Chemical Co., St. Louis, pending the return to duty of **Fred C. Renner,** who is recovering from a serious illness. **A. T. Loeffler,** branch manager at New York, has been assigned to St. Louis with the temporary title of assistant general manager of sales; **A. P. Kroeger,** St. Louis, manager of intermediates sales, has gone to New York as acting assistant branch manager, and the duties of **C. H. Sommer,** manager of plasticizers and resins sales, have been extended to include those of acting manager of intermediate sales. **F. M. Luckett,** sales representative in the Chicago territory, has been assigned temporarily to St. Louis to assist Mr. Sommer.

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David F. Devine has been appointed comptroller, Bell Aircraft Corp., Buffalo, succeeding **John Berry Jr.,** resigned.

—o—

George L. Morris has been elected vice president in charge of the Wire and Special Machinery Division, Syncro Machine Co., Perth Amboy, N. J. In addition, Mr. Morris is general sales manager. **Ernest W. Clark,** who retired Jan. 1 after 38 years with the Wire and Cable Division of General Electric Co., Schenectady, N. Y., has become associated with Syncro Machine Co. as consulting engineer.

—o—

W. W. Gleeson has been appointed vice president and general manager, L.G.S. Spring Clutch Corp., Indianapolis, wholly-owned subsidiary of Curtiss-Wright Corp., New York. Formerly Mr. Gleeson was general production manager of the corporation's Propeller Division, Caldwell, N. J.

—o—

George Cooke Lea has joined the Ohio Nut & Bolt Co., Berea, O., as vice president. For the past two years Mr. Lea has served as assistant counsel for the Bureau of Ordnance, Navy Department, holding the rank of lieutenant commander, and for ten years prior to entering the service he was associate counsel, American Institute of Bolt, Nut and Rivet Manufacturers, Cleveland.

—o—

George S. Gildersleeve, assistant export manager, Truscon Steel Division, Republic Steel Corp., recently was elected president of the Machinery-Metals Export Club, New York. He succeeds **E. C. M. Gyllensvard,** Sullivan Machinery Co. Other officers are: **E. H. Gaither,** B. F. Sturtevant Co., first vice president; **Harry G. Vollmer,** United States

CHARLES W. SPRINGER

JOSEPH A. McGRANE

N. R. JOHNSON

S. S. KAHN

Steel Export Co., second vice president, and **F. J. Muller** and **K. P. Bliss,** both of Business Publishers International Corp., secretary-treasurer and assistant secretary-treasurer, respectively.

—o—

Charles W. Springer, formerly sales manager, Barrel Division, Jones & Laughlin Steel Corp, Pittsburgh, has been appointed manager of eastern sales, Graver Tank & Mfg. Co. Inc., East Chicago, Ind.

—o—

Dr. Wallace J. Eckert, head astronomer and director of the Nautical Almanac Office at the United States Naval Observatory, Washington, has been appointed director of the Department of Pure Science, International Business Machines Corp., New York.

—o—

Philip S. Cottier has been named purchasing agent of Pittsburgh Steamship Co. and Pittsburgh Supply Co., both subsidiaries of United States Steel Corp., succeeding **John A. Boyink,** who is retiring after more than four decades of service. Mr. Boyink will continue in an advisory capacity. **Edward F. Gravenstreter** has been appointed assistant purchasing agent and manager of stores, a newly-created post.

—o—

Promotions in the Tape Division, Minnesota Mining & Mfg. Co., St. Paul, include: **Bernard W. Lueck,** products sales manager of industrial "Scotch" masking tape, sandblast stencil and "Scotch-Rap"; **Robert L. Westbee,** sales manager of electrical tape and electrical insulation products, and **C. N. Del Porte,** sales manager, shoe tape.

—o—

William E. Cairnes has been appointed chief engineer, Home Radio Division, Galvin Mfg. Corp., Chicago, and **Gus Wallin** has been named assistant chief engineer of that division.

—o—

James C. Hartley has been appointed director of research of the Heppenstall companies, Pittsburgh, Bridgeport, Pa., and Detroit. Mr. Hartley also has been appointed chairman of the Heppenstall research committee. His headquarters will be in Pittsburgh. Prior to joining Heppenstall, Mr. Hartley was chief metallurgist, Aluminum Forgings Inc., Erie, Pa.

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Joseph A. McGrane has been appointed field service engineer in Detroit for Rustless Iron & Steel Corp., Baltimore.

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N. R. Johnson has been appointed factory manager, Buffalo Forge Co., Buffalo, and he is succeeded as director of purchases by **H. D. Hebard.**

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Lewis M. Holland, formerly industrial engineering director, Higgins Aircraft Inc., New Orleans, has joined the staff of the San Francisco Chamber of Commerce as industrial engineer.

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John M. La Dieu, public relations director at General Engineering & Drydock Co., Alameda, Calif., has been elected chairman of the San Francisco Bay Area Public Relations Conference, a group organized to spotlight the 11 counties of the Bay area for postwar industrial development.

—o—

Charles Stoeckly has been named Pacific district motor specialist, General Electric Co., Schenectady, N. Y. He will be attached to the Industrial Division staff with general supervision over motor division product sales in California, Nevada and Arizona, making his headquarters in San Francisco.

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George A. Turmail has been appointed special representative of Continental Can Co. Inc., New York.

—o—

S. S. Kahn has been appointed sales and advertising manager, Parker-Kalon Corp., New York. Mr. Kahn succeeds the late Charles S. Trott.

—o—

Charles H. Colvin has been elected president of the Institute of the Aeronautical Sciences. Vice presidents elected were: **W. A. M. Burden,** Assistant Secretary of Commerce; **LeRoy R. Grumman,** Grumman Aircraft Engineering Corp., Bethpage, N. Y.; **I. M. Laddon,** vice president, Consolidated Vultee Aircraft Corp., San Diego, Calif., and **Arthur E. Raymond,** engineering vice president, Douglas Aircraft Co. Inc., Santa Monica, Calif.

—o—

Otto Tatus, for the past six years general manager, National Iron Works, San Diego, Calif., has resigned to devote full time to Continental Engineering Service, Bonita, Calif., his own firm.

—o—

C. Fred Hastings has been appointed general sales manager, American Central Mfg. Corp., Connersville, Ind., and he is succeeded as assistant general sales manager by **Byron C. Wagner.**

—o—

William A. Irvin, a member of the board of directors and finance committee of United States Steel Corp., Pittsburgh, has received the Gary Medal in recognition of 50 years of service in the corporation and predecessor companies. Mr. Irvin was elected president of United States Steel in 1932, retiring in 1938. For a brief period then he served as vice chairman of the board, and since that time has been acting in an advisory capacity.

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John R. Munn has been elected president of Elastic Stop Nut Corp., Union, N. J.

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John Lucas, formerly vice president and assistant general manager, Yoder Co., Cleveland, has been elected president and general manager. Mr. Lucas succeeds Carl M. Yoder, who died last September. **Frank Sargeant,** assistant treasurer, becomes assistant secretary also.

—o—

Everett C. Hite has been appointed combustion and refractories engineer in the steel mill metallurgical department, Timken Roller Bearing Co., Canton, O.

—o—

Appointments made at Allegheny Ludlum Steel Corp.'s Watervliet, N. Y., plant include: **James H. Baldrey,** superintendent of the melting department, succeeding **T. F. McClester,** retired; **Edward J. Doyle,** superintendent of the hammer shop, replacing **W. H. White,** retired, and

William E. Lloyd, storekeeper, replacing **William Connolly**, retired. **W. O. Jackson**, for the past 20 years or more superintendent of hot mills and hammers at the company's Howard avenue plant, Dunkirk, N. Y., has retired.

—o—

Milton W. Allen has been appointed sales representative in Colorado, Utah, Wyoming, New Mexico and Montana for National Screw & Mfg. Co., Cleveland. He will make his headquarters in Denver.

—o—

James MacBeth has become associated in a sales capacity with Max Solomon Co., Pittsburgh. He resigned as manager of pig iron sales for Jones & Laughlin Steel Corp., Pittsburgh, which position he has occupied since 1941. Mr. MacBeth was connected with Jones & Laughlin for 30 years.

—o—

Norbert E. Smith has been appointed district sales manager of the newly-opened Indianapolis office of Inland Steel Co., Chicago, effective Feb. 10. The office will be located in Suite 831-3, Architects & Builders building, 333 N. Pennsylvania street.

—o—

Theodore A. Harper has been appointed manager of cold finished bar sales, Grammer, Dempsey & Hudson Inc., Newark, N. J. Mr. Harper recently resigned his position as manager of Columbia Steel & Shafting Co., Edgar T. Ward's Sons Co., and Summerill Tubing Co., Newark, N. J. operations, where he had been for the past seven of his 26 years with those companies.

RALPH D. HAVILAND

Who has joined Snyder Tool & Engineering Co., Detroit, as head of the purchasing department, reported in STEEL, Jan. 22, p. 70.

—o—

John W. Haddock, president, Farrel-Birmingham Co. Inc., Ansonia, Conn., since March, 1943, has resigned.

—o—

George E. Benson has been elected vice president in charge of finance, Youngstown Sheet & Tube Co., Youngstown, O., succeeding the late Walter E. Meub. He also continues as treasurer. **Lewis B. Williams**, chairman, National City Bank of Cleveland, was elected a director, to succeed the late Fred Tod.

—o—

Esty Foster has been elected president, National Lock Washer Co., Newark, N. J., succeeding **Cyrus H. Loutrel,** who becomes board chairman. New directors are: Mr. Foster, **Arthur W. Preikschat** and **Gilbert E. Webster.** Mr. Preikschat and Mr. Webster are vice presidents.

—o—

Harry L. Myers has been appointed assistant personnel director, Allegheny Ludlum Steel Corp., Pittsburgh, succeeding **Walter C. Titus,** who is retiring after 20 years with the company. **George C. Floyd** has been named plant manager at West Leechburg.

—o—

Lloyd G. Pattee has been named president and treasurer, O. B. McClintock Co., Minneapolis, to succeed the late O. B. McClintock. Mr. Pattee was formerly executive vice president and general manager. **M. L. McClintock, Glenn S. Stiles** and **W. P. Christian** were elected vice presidents.

—o—

George Buffington, executive vice president, National City Bank, Cleveland, and **James L. Myers,** executive vice president, Cleveland Graphite Bronze Co., Cleveland, have been elected directors of the Weatherhead Co., also of that city.

OBITUARIES . . .

Ronald B. McKenzie, 46, founder of the Keystone Heating Co., Latrobe, Pa., and president of Acme Die & Machine Co., also of that city, died Jan. 23 in Pittsburgh.

—o—

John Eckerle, 75, chairman, Aluminum Industries Inc., Cincinnati, died Jan. 24 in Miami Beach, Fla. In 1920 he and a son-in-law, Harry J. Hater, bought the Kant-Skore Piston Co. and moved manufacturing operations from Buffalo to Cincinnati, later changing the firm name. He was president of the company until last July.

—o—

Eshelby F. Lunken, 54, president of the Lunkenheimer Co., Cincinnati, died there Jan. 25. His father, Edmund H. Lunken, who was chairman of the company's board of directors, died last July.

—o—

Howard Teel Brinton, 39, assistant manager of sales, Wheeling Corrugating Co., Wheeling, W. Va., died Jan. 28 in Washington. For the past year Mr. Brinton has been serving in the Steel Division, WPB.

—o—

Arthur Jellinek, 51, dealer in metals, New York, died Jan. 26 in that city. Mr. Jellinek was associated with Arthur Seligman & Co. Inc., New York, from 1908 to 1934. After two years with Reynolds Metals Co. Inc., Richmond, Va., he formed his own company for the export and import of metals and handled exports for Aluminum Industries Inc., Cincinnati.

—o—

Oscar O. Laudig, a steel engineer who built and put into operation the first blast furnace of the Tata Iron & Steel Co., Jamedsphur, India, in 1911, died Jan. 21 in Pittsburgh.

—o—

Arthur J. Morse, founder and president of Alloy Steel & Metals Co., Los Angeles, died Jan. 17 in San Juan Capistrano, Calif.

—o—

Raymond I. Caspers, 66, co-chairman of the board and secretary, Caspers Tin Plate Co., Chicago, died Jan. 23 in that city. In 1922, following long experience in the tin plate industry, Mr. Caspers and A. E. Thiffault organized the company to conduct a tin plate jobbing business. Metal decorating is the company's business today.

—o—

Herman C. Dreis, 81, founder of Dreis & Krump Mfg. Co., Chicago, died Jan. 19 in Santa Cruz, Calif. He was president at the time of his retirement about 20 years ago.

—o—

Louis N. McCarter, 78, founder and president, McCarter Iron Works, Norristown, Pa., died there Jan. 28. He founded the company in 1920, having served previously as general manager of the ironworks of R. S. Newbold & Sons, Norristown.

—o—

N. F. Cornelius, 61, founder and president, Cornelius Co., Minneapolis, died there recently.

—o—

Charles Lester Bryant, 67, president-treasurer, C. L. Bryant Corp., and president, Bryant Machine Products Co., both of Cleveland, died Jan. 29 in that city. Mr. Bryant founded those two companies as well as Bryant Heater, Cleveland, which still bears his name, although he sold his interest in the company many years ago.

—o—

Commander Ferry C. Houghten, 56, ventilation engineer with the Research Division, Navy Bureau of Medicine and Surgery, died recently in Chelsea, Mass. Commander Houghten was made director of research for the American Society of Heating and Ventilating Engineers in 1926.

—o—

Fred W. Grant, merchandising engineer, Norton Co., Worcester, Mass., and for 25 years head of the company's Abrasives Division in Wisconsin, died Jan. 25 in Worcester.

—o—

Irving K. Hutchinson, 52, secretary-treasurer, Continental Scale Corp., Chicago, which company he helped to organize, died Jan. 27 in that city.

Coast Cities Piling Postwar Work

San Francisco and Oakland planning for full-time employment. "Work pile" of private enterprise in those two cities exceeds $282 million

SAN FRANCISCO

POSTWAR "work pile" plans, calling for the full-time employment of 46,327 craftsmen and essential wage earners and the expenditure of $231,635,400 for new construction and business expansion, were revealed recently by the Oakland Chamber of Commerce. Of this total, private business has pledged to expend $156,635,400 while Oakland and Alameda public improvement projects, exclusive of federal and state aid, will amount to $75 million.

When combined with the San Francisco Chamber of Commerce's estimate of postwar projects totaling $126,206,739, private enterprises in the two bay area cities will have rolled up a postwar work pile amounting to $282,842,139 worth of building, remodeling, fixture and equipment buying and other expansions promised to create thousands of transition jobs.

In making public the city's postwar plans, it was stressed that all-out war effort is Oakland's No. 1 job until victory.

General divisions in the "work pile" report included: Industrial, $11,643,300; commercial $9,697,600; services, $9,107,000; apartment houses, $16,000,000; utilities, transportation and communications, $26,587,500; new homes, $77,200,000; and remodeling, $6,400,000. The commercial figure includes $3,500,000 in modernization by the major Oakland department stores while local motor car dealers expect to spend $1,500,000 in modernization and finance and banking concerns $750,000.

Another addition to the bay area's proposed postwar spending is the women's "work pile" of $842,728 compiled by the San Francisco chamber. According to 1049 questionnaires circulated among housewives, immediate home repair and remodeling work will amount to $206,498 and new additions or fixtures such as furnaces, water heaters and lighting will cost around $25,980.

The city of San Francisco, in addition to "work pile" plans, has set up its own master plan, with $131,000,000 to be spent on sewers, schools, streets and buildings, airports, tunnels and other big projects.

A postwar employment level approximately 33 per cent above the present and 23 per cent over the normal prewar level in the San Francisco plant of the American Can Co. was predicted last week by E. H. Bell, vice president.

Portland Chapter of Foundrymen Approved

Formation in Portland, Oreg., of the twenty-ninth chapter of American Foundrymen's Association has been approved by the association's board of directors, and the organization meeting of the new group was held recently in Portland.

Development of this first foundry organization in the Pacific Northwest was sponsored by a committee headed by William R. Pindell, Northwest Foundry & Furnace Works, Portland, with foundrymen in the area co-operating.

War Production Stepped Up In Southern California

LOS ANGELES

Paced by a 30 per cent stepup in aircraft, Southern California war plants are humming as never before. Under government orders which lead to a 65 per cent increase in all local war goods making hereabouts by the second quarter of 1945, the only limitations appear to be those of materials and manpower.

Manpower shortages here remain at around 25,000 (in Los Angeles county). Lack is felt mostly in shipyards and rubber factories. Real reason for the lack in these industries is probably threefold: First, lack of housing for enough workers near enough the shipyards and rubber plants. Second, lack of sufficient transportation to and from the same sites. Third, in the main, shipbuilding and rubber fabricating is plain hard work that takes strong men, which rules out women, except on a few special jobs.

Twenty firms in the Los Angeles metropolitan area have been granted "spot authorization" approvals by the WPB local office to resume manufacture of civilian goods. Agricultural equipment, including orchard heaters, spray guns and irrigation sprinklers, figure largely in the $1,933,250 worth of scheduled production.

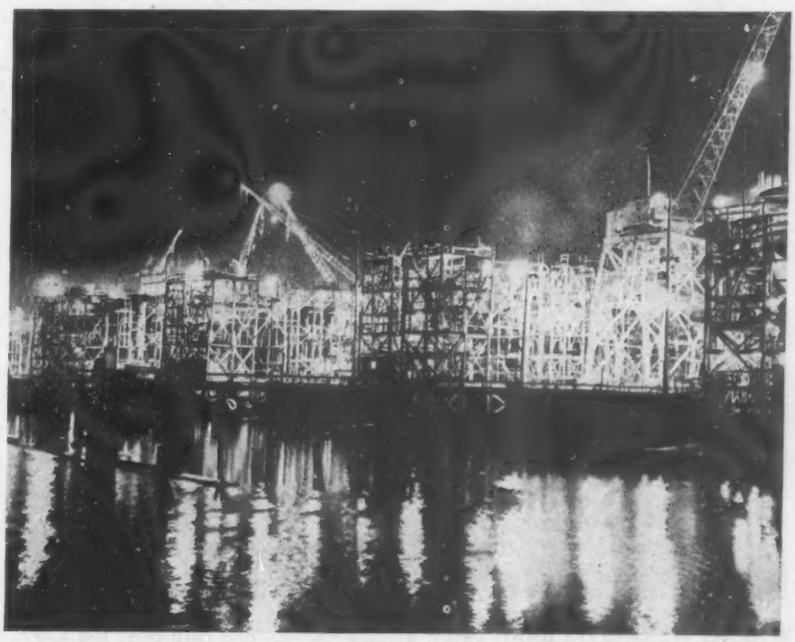
Pacific Car & Foundry Co. Buys Control of Truck Firm

SEATTLE

Pacific Car & Foundry Co., Seattle, has obtained controlling interest in the Kenworth Motor Truck Corp., Seattle. Both companies will continue to execute war contracts, so no immediate change is anticipated. In the postwar period it is planned to use both plants in development and manufacture of highway and city passenger motor coaches and similar equipment. Kenworth manufactures heavy duty trucks while Pacific Car in normal times turned out logging machinery, railway cars, and motor coach bodies.

Edgar F. Kaiser has announced at Portland, Oreg., that the three Kaiser shipyards in that area have sufficient work on hand to assure full time employment for 90,000 workers through 1945.

Oregon Shipbuilding Co. has awarded contract for furnishing aluminum sheets and extrusions for the 4000 aluminum half pontoons it is building for the Army.



LIGHT FOR VICTORY: Night is turned into day at Marinship's yard, Sausalito, Calif., as production of tankers continues around the clock. Mirrored in San Francisco bay, the lights of the busy plant can be seen for miles around each night. NEA photo

WING TIPS

Boeing's new super cargo and troop transport, adaptation of B-29, establishes coast-to-coast flight record averaging 383 miles an hour. Capable of carrying two 1½-ton trucks, two light tanks, or 100 fully equipped troops

FIRST details of a new super cargo and troop transport for the Army Air Forces, the Boeing C-97, have been announced by the AAF and the Boeing Aircraft Co., following a series of highly successful test flights of the huge craft.

The plane is a transport counterpart of the Boeing B-29 Superfortress and exceeds all existing Army Air Force transports in range, payload and size. It is capable of carrying more than 100 fully equipped troops for long distances at exceptionally high speed.

The plane recently established a record coast-to-coast flight from Seattle to Washington of 6 hours, 3 minutes and 50 seconds, an average of 383 miles an hour.

The C-97 was designed and built by Boeing at Seattle, under contract with the Air Technical Service Command of the AAF, whose chief of engineering and procurement is Maj. Gen. K. B. Wolfe, former commanding general of the famed 20th Bomber Command. The huge plane was developed in close liaison with ATSC engineers.

A commercial version of the plane, to be known as the Boeing Stratocruiser, and capable of carrying up to 100 persons in luxurious comfort for operating ranges up to 3500 miles with ample fuel reserves, already has been announced by the Boeing company for postwar use.

A unique feature of the C-97 is a pair of great loading doors which open under the rear of the fuselage, with a drive-up ramp which is let down from within. The ramp is self-contained in the plane and is retracted into the airplane by an electrically powered cargo hoist, so that no special equipment is necessary on the field to load or unload the transport. Two fully-loaded 1½-ton trucks can be driven up the ramp and into the airplane with plenty of room left for other equipment or cargo, or two light tanks can be accommodated. The cargo hoist operates on a ceiling rail along the entire length of the fuselage.

The C-97 utilizes the Boeing "117" low-drag wing and other aerodynamic advancements which have been proved on the B-29. Like the Boeing Stratoliner and the B-29, the new transport is pressurized for operation at high altitudes to provide the greatest possible comfort on long hops, so that troops will arrive at their destination fresh and ready for action. This feature is also advantageous when the plane is used as a hospital plane.

Engines of the initial C-97 are the same as those used on the B-29—2200 horsepower Wright Cyclones, driving Hamilton Standard 4-bladed propellers. For postwar airline operation Boeing has announced that the commercial versions will be equipped with engines expected to develop up to 3500 horsepower each.

Details of the ship's performance, operating range, etc., like those of the B-29 Superfortress, are restricted for military reasons. However, the C-97 is larger, faster and will carry a greater load farther than any other military land transport.

The C-97 has wings, tail surfaces and landing gear identical to those of the B-29, but the volume—10,000 cubic feet—is more than twice that of the B-29. It has usable cargo space almost equal to that of two average railway box cars.

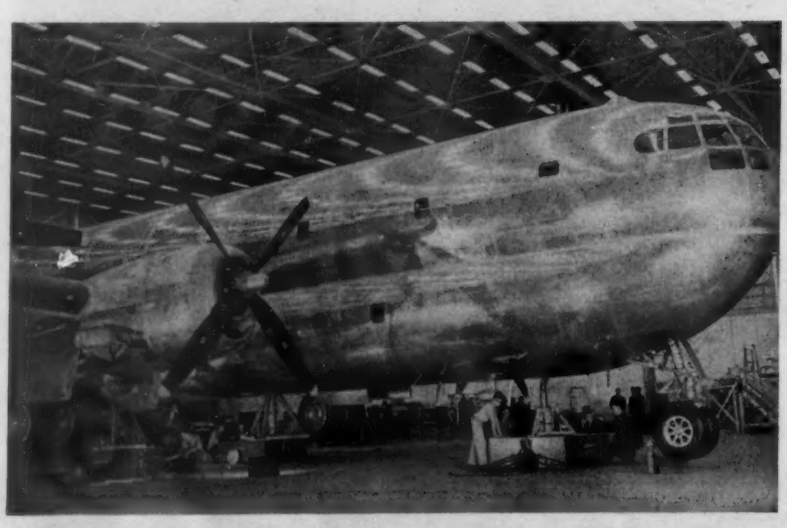
The plane is 110 ft. 4 in. long, 12 feet longer than the B-29. Its wingspread of 141 ft. 3 in. is the same as that of the Superfortress. Its design gross weight is 120,000 pounds.

The standard crew for the new sky giant will be composed of a pilot, co-pilot, flight engineer, radio operator, and navigator.

The two decks of the new airplane are achieved by building, in effect, one fuselage section on top of another, the upper section being longer and the two streamlining into each other. The bottom section is the same diameter as the B-29 and the top section considerably larger. A cross-section of the plane thus resembles an inverted figure "8".

This two-deck arrangement, with two separate cabins below and a main cabin 78 feet long above, allows unusual versatility in utilizing the airplane for military cargo.

To facilitate loading and unloading, the powered traverse hoist operates directly over the main loading doors so that a truck can be backed under it or loads can be picked up direct from the ground. The latest developments in cargo tie-down systems are included, which makes obsolete former systems of ropes and nets. One method, for example, employs use of four large pallets which are pre-loaded on the ground and the cargo lashed down. The entire platform is then lifted into the ship.



BOEING WEIGHS ITS BABY: Latest Boeing four-engine airplane, the C-97, which is a military transport adaptation of the famous B-29 Superfortress, is shown above as it was weighed in the Renton, Wash., factory of the company. Photo illustrates how the two decks of the plane are achieved by building, in effect, one fuselage on top of another

52,000 Crankshafts Made By Cleveland Company

Since Pearl Harbor more than 52,000 precision made 14-cylinder aviation crankshafts for 1700 horsepower Cyclone engines have been machined and shipped by the Ohio Crankshaft Co., Cleveland, reports William C. Dunn, president.

Ohio Crankshaft is now in full production on a new and larger radial engine crankshaft for 18-cylinder Cyclone engines going into the B-29 Superfortress.

"The new aviation crankshaft we are machining is a larger counterpart of our 14-cylinder model except for brass counterweights which replace the steel weights used on the smaller unit. Both shafts move down the same machining lines," commented Mr. Dunn.

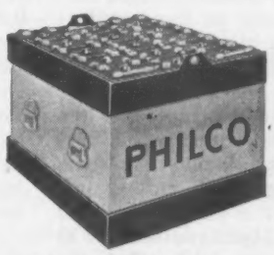
Machining a radial engine crankshaft is a super precision job involving more than 600 operations, 60 per cent of which are highly precise. More than 145 dimensions on these two crankshafts are held to a total tolerance of .001-inch, while seven bearing surfaces have a finished smoothness of four millionths of an inch.

LET PHILCO REDUCE YOUR POST-WAR PRODUCTION COSTS

Philco is ready, *today,* with the advanced high-capacity battery performance and long-life economy you'll need in your post-war operations. The complete Philco post-war line includes modern Storage Batteries for all motive power and stationary needs. It will save you dollars in depreciation, up-keep and maintenance costs to specify Philco. Let us send you the latest Philco Battery catalogs of types for your special requirements. Philco Corporation, Storage Battery Division, Trenton 7, N. J.

THE NEW PHILCO "THIRTY"—An outstanding post-war product for industrial trucks is the new Philco "Thirty" Storage Battery that gives 30% longer life and is identified by its distinctive red top. Now available in certain types and limited quantities.

Philco Telephone and Control Battery Cell with Floté element



Typical Philco Electric Industrial Truck Battery in Steel Tray

Specify PHILCO STORAGE BATTERIES

For 50 years a leader in Industrial Storage Battery Development

AIRBORNE BAZOOKAS: Rocket launchers are mounted three in a cluster under the wings of P-47 Thunderbolt fighters to transform the planes into "flying artillery." The bazooka barrels are produced by General Electric Co., Schenectady, N. Y., from a special paper plastic on a special type of tube-roller produced by Baldwin Locomotive Works, Philadelphia

Success of AAF in Bombing Enemies Once Threatened by Small Bearings Shortage

KNOWN to only a few military and industrial officials at the time, the success of the Army Air Forces mission in effectively destroying the German industrial system and the Japanese Empire lifeline hung precariously on the manufacture in this country of one of the smallest of all items used by the aircraft industries.

Revealing for the first time how the manufacturing of an instrument ball bearing was threatening to nullify our whole aircraft expansion program and jeopardize the effectiveness of our bombers, Air Technical Service Command officials at Wright Field, O., now disclose how the most guarded and secret invention of this war, the Norden bombsight, was almost not produced in large enough quantities for the lack of special ball bearings on which its performance depended.

On the manufacture of these special bearings rested the fate of our theory of precision bombing as against the British theory of area and pattern bombing. At Wright Field in early 1942 it was being decided on whether the AAF could be provided with the already proved bombsight for pinpoint bombing or whether a new method had to be devised.

When it was discovered by the AAF that the bearing industry of America had been dependent on Germany, Sweden and Switzerland for most of its smallest bearings, an urgent request was made of the bearing industry to start making these special bearings.

Until 1940, American industry's smallest bearing assembly, which includes inner and outer ring, had an overall dimension of three-eighths of an inch in diameter. While cups and rings were being made for smaller varieties, Germany was supplying the balls—one millimeter or about one-twenty-fifth of an inch in diameter. The smallest ball being made in America at that time was one-sixteenth of an inch.

As Germany continued her successes, the small bearings with the Nazi one-millimeter balls, were not coming in in regular shipments from Switzerland. The supply, in fact, was cut off entirely except for a few thousand which were being brought in through devious methods from time to time. This source was finally closed off entirely in the summer of 1941.

The bombsight then called for 61 ball bearings of 25 different types, some of which, in terms of sensitivity, were the most difficult of all bearings to make. The actual operation of the bombsight depended on these sensitive bearings. If they did not function perfectly, American flyers would be dropping incendiaries, blockbusters, and other explosives off the target.

Some idea of their sensitivity can be gained from the so-called "brush" test to which they are subjected. Though simple, this test is revealing. The bearing is first placed in a steel wheel weighing 3½ pounds, and then mounted on an arbor. Next the hairs of a common camel's-hair paint brush are drawn lightly over the heavy ring. This extremely light touch has to move the ring and the bearing back and forth.

The bearing industry tackled the problem in mid-1942 and within one year was producing them in quantities sufficient to meet demands. Thus, one of the greatest weapons was assured the Army Air Forces.

That it took only a year to design, set up manufacturing machinery and start production belies the great problems that were to be overcome to start mass production.

These instrument bearings required greatest attention in manufacturing and demanded infinite attention to details every step of the way from the finished part until the bearing was finally lubricated and packaged, so as to insure its reaching the customer without change.

Because on the performance of these bearings depended in many cases the safe operation of the plane, they had to be made as nearly perfect as man could make them. The margin of error allowed for manufacture was from 1/10,000 to 1/20,000 of an inch.

These bearings had to be dirt and dust proof, requiring special air-conditioned rooms. Humidity, temperature and air pressure had to be controlled. To clear the room of dust, a device was built to charge dust particles in the air and cause them to cling to plates by which they were withdrawn from the plant.

Using women in most plants, because of the dexterity of their small hands, they were forced to use forceps and tweezers to handle the tiny parts. On top of this, magnifying glasses and even microscopes had to be used on routine operations.

But making just one group of special bearings for one instrument was only one of the many problems facing the bearing industry in 1942. The special steel that was required in balls was at a premium until the War Production Board gave the industry an A-1-C priority rating.

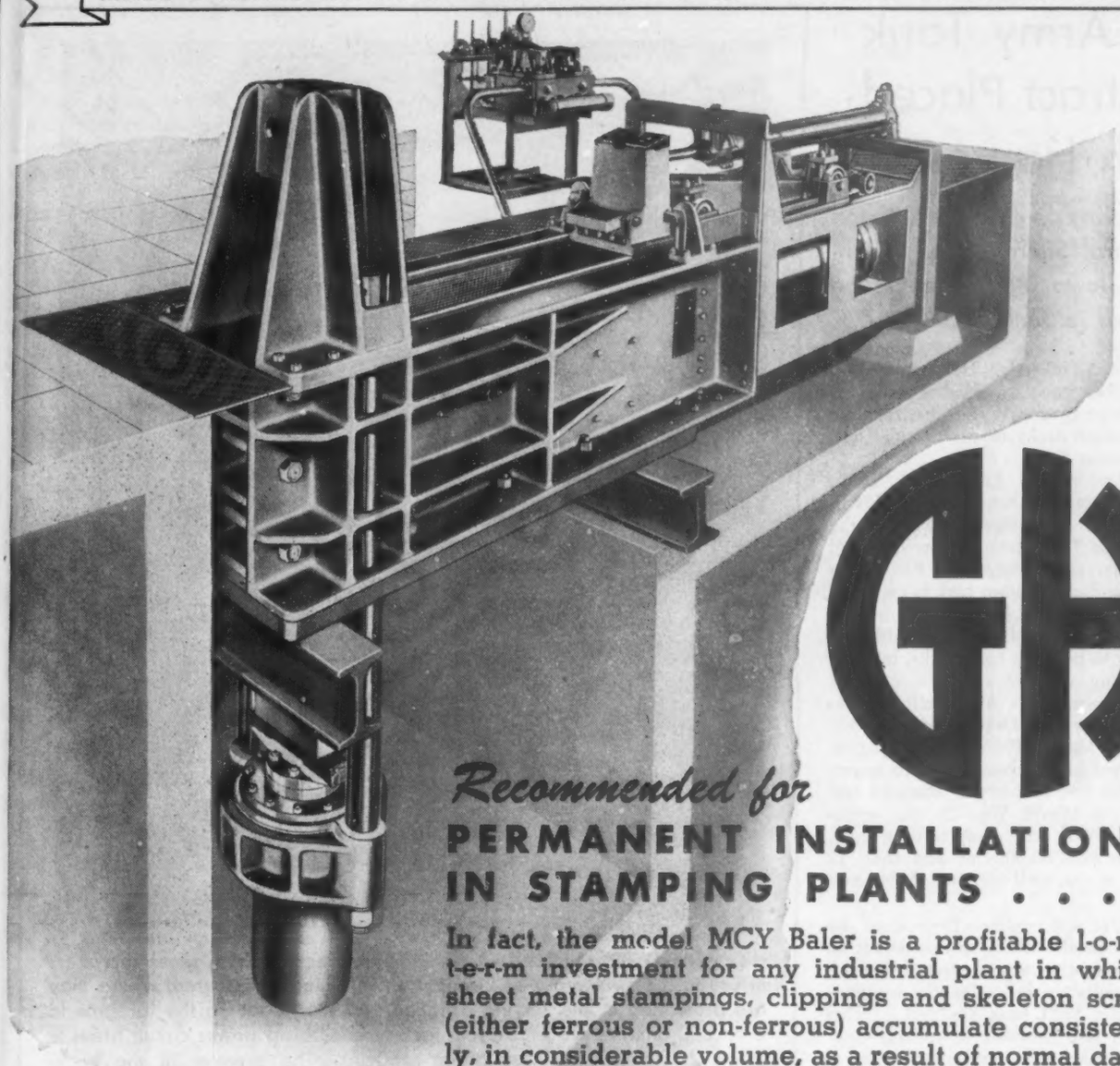
All-White Assembly Line Installed by Douglas

Designed to raise C-54 transport output 250 per cent by late summer, a new all-white, ultra-modern assembly line is being completed in Douglas Aircraft's Santa Monica, Calif., plant.

Ceilings, walls and all parts of operating equipment have been transformed into a "white city" completely bathed in paint of highest reflective efficiency.

Illumination studies by plant engineers revealed that the overall paint job of cream and white stepped up light values by about 50 per cent.

MAKE GALLAND-HENNING YOUR HEADQUARTERS FOR SCRAP BALING COUNSEL



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SCRAP METAL BALING PRESSES

A 4523-1P-C

Big Army Tank Contract Placed With Harvester

Company will build 30-ton General Shermans at Bettendorf, Iowa. Production to be started in June

INTERNATIONAL Harvester Co., Chicago, has been awarded a $45 million contract by the War Department to build medium tanks of the 30-ton General Sherman type.

According to Col. John Slezak, chief, Chicago Ordnance District, the work will be done at Bettendorf, Iowa, in the Quad Cities Tank Arsenal now operated by the Harvester company. Production of this standard medium tank is expected to get under way in June.

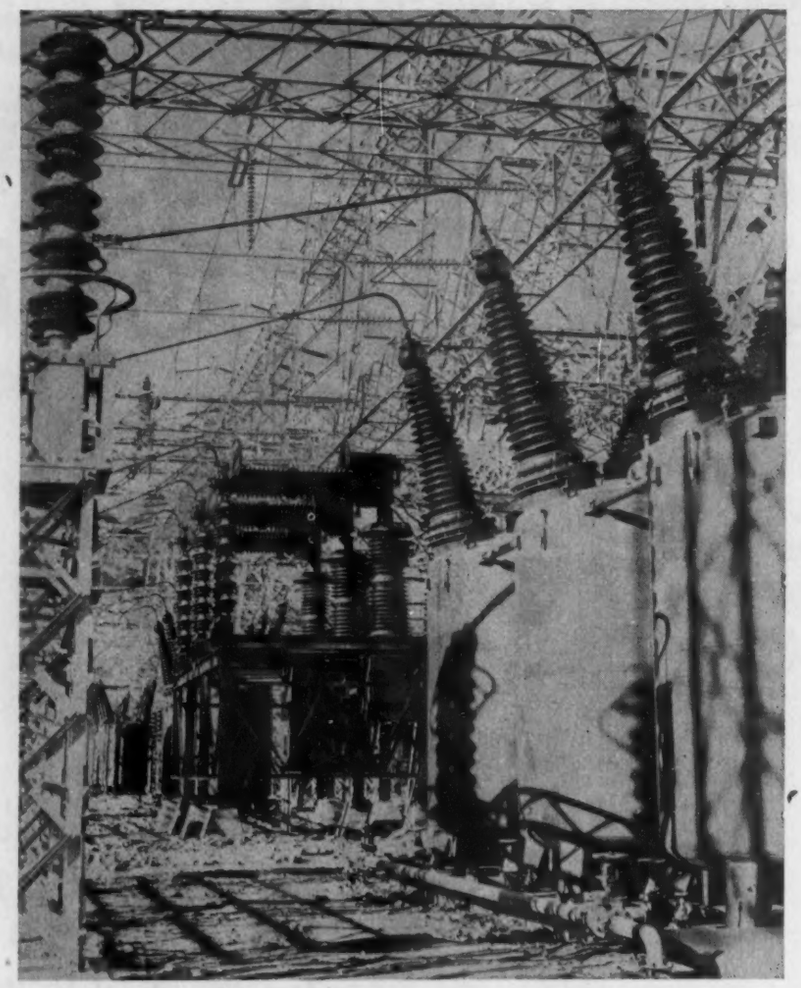
The Bettendorf plant was established originally to produce light tanks, but due to changing military requirements, the Harvester company's $217 million contract with the War Department was terminated in March, 1943, before full production had been achieved. This represented the first major war contract termination of World War II, the settlement of which was completed in July, 1944, for $25,300,000, or less than 12 per cent of the total amount of the contract.

Harvester will continue to produce the M-5 high-speed artillery prime mover on which production was started at Bettendorf immediately following the termination of the light tank contract. This plant will also continue to rebuild General Sherman tanks until production of the new tank gets under way.

SWPC Consultant Becomes War Department Analyst

Lowell L. Henkel, for a year technical advisory consultant, Smaller War Plants Corp., Washington, resigned recently to become minerals research analyst of the Material Study Group, Department of Research, Army Industrial College, War Department, Washington. The group is concerned with analysis and evaluation of economic information related to raw materials with special reference to essential and strategic commodities in the internal economy of the United States.

Prior to becoming affiliated with SWPC, Mr. Henkel had been senior industrial specialist, technical development section, War Production Board, Chicago. For eight years before entering government service in May, 1942, he was research engineer, metallurgist and chemist, Interlake Iron Corp., Chicago. In 1941-42, Mr. Henkel was chairman of the Chicago chapter, American Foundrymen's Association.



HIGH-SPEED BREAKERS: Two of General Electric's high-speed breakers in use in the switchyard at Grand Coulee Dam, Washington, where they are protecting a line serving an important war load. In the foreground is an 800 ampere, 23-kv, 5-cycle tank-type oil-blast power circuit breaker rated 2,500,000-kva interrupting capacity. The breaker in the background, a 230-kv, 3-cycle, impulse-type oil circuit breaker rated 3,500,000-kva interrupting capacity, is one of two originally built for installation at Shasta Dam. Its assignment at Coulee Dam is temporary

BRIEFS . . . .

Paragraph mentions of developments of interest and significance within the metalworking industry

Terteling & Son and C. W. Driver Inc., Los Angeles, which recently were awarded "command construction" jobs from the Navy report progress on the projects, both of which are at the naval drydock on Terminal Island, Los Angeles harbor.

—o—

Paisley Products Inc., Chicago, has announced four newly improved water-resistant adhesives designed for overseas packaging of military parts.

—o—

Lincoln Electric Co., Cleveland, and one of its employes are featured in a recent issue of *Adventures in Business,* published at Buena Park, Calif., which told about Lincoln's incentive pay plan.

—o—

Portable Products Corp., Pittsburgh, has purchased the C. J. Tagliabue Mfg. Co., Brooklyn, N. Y.

—o—

Titan Metal Mfg. Co., Bellefonte, Pa., has expanded its forging department and has some open capacity for heavy brass forgings up to 100 pounds.

—o—

Western Pipe & Steel Co. shipyard, South San Francisco, has been given a third Maritime Commission award for continued outstanding achievement in

ship construction, and a new Treasury Department flag for an excellent record in war bond purchases through payroll deductions.

—o—

Peabody Engineering Corp., New York, is observing its twenty-fifth year in business, and has received the Maritime Commission's "M" award and the Victory Fleet Flag for outstanding production.

—o—

Standard Oil Co. of California recently dedicated at Richmond, Calif., its new $20 million Defense Plant Corp. 100-octane gasoline plant, capacity of which is enough to power 50 B-29s on a round trip from Saipan to Tokyo daily.

—o—

Production Engineering Co., Berkeley, Calif., is expected to use temporarily the Riverbank aluminum plant, San Francisco, formerly operated by Aluminum Co. of America, for the production of fuses.

—o—

Allis-Chalmers Mfg. Co., Milwaukee, has developed a new mercury arc converter which fills out the low frequency range of electronic equipment required in the growing field of induction heating applications.

—o—

Monsanto Chemical Co., St. Louis, plans volume production of aluminum metaphosphate in the postwar era, and predicted the product will open new horizons to glass manufacturers.

—o—

General Electric Co., Schenectady, N. Y., has as its prime mission the production of war weapons and equipment at an ever increasing tempo, Charles E. Wilson, president, emphasized in a report to stockholders.

—o—

National Electrical Manufacturers Association, New York, has postponed the International Lighting Exposition scheduled for April in Chicago to co-operate with the government's ban on meetings.

—o—

Ordnance Industry Integration Committee at a meeting recently at French Lick, Ind., laid the groundwork for doubling production within six months of the highly urgent M48A2 fuse for heavy artillery shells.

—o—

Monsanto Chemical Co., St. Louis, will begin volume production of melamine, a century-old Swiss chemical, neglected for years and now found to possess utility in a wide range of war applications.

—o—

Continental Industries Inc., New York, has purchased the Hanover Wire Cloth Co., Hanover, Pa.

—o—

Remington Rand Inc., announces that by late spring this year all of its sales division offices in Buffalo will have been moved to New York city. The company's general offices will remain at Buffalo.

—o—

The Cleveland Pneumatic Tool Co., Cleveland, is observing its fiftieth year in business and has issued an anniversary book entitled "Pioneers for 50 Years."

—o—

The B. F. Goodrich Co., Akron, O., has added to its line of industrial hose a complete series of Lonn blow guns.

—o—

American Can Co., New York, is to increase by more than 100 per cent its production of machine gun cartridge belt links.

—o—

United States Rubber Co., New York, is producing a new synthetic rubber latex at the government's synthetic latex plant at Naugatuck, Conn.

—o—

The Chicago Bridge & Iron Co. has reopened its Los Angeles office in the William Fox building, 608 South Hill street, under direction of Dean E. Stephan who was transferred from the firm's Washington office.

—o—

Emery Floor Co. Inc., 330 West Forty-second street, New York, has been organized to lay industrial floor toppings where Cortland emery aggregate is used.

—o—

Nickel Plate railroad plans a $1,600,000 improvement for its Bellevue, O., facilities, including a roundhouse, turntable, machine shop, and boiler house.

—o—

The Harvey Machine Co. Inc., Los Angeles, has issued an urgent call for highly skilled engineers who may be in between jobs.

—o—

Babcock and Wilcox Co. gun mount plant's welding school at Alliance, O., has given 85,000 man hours of instruction in welding and taught 398 men and women since the school started in December, 1940.

—o—

Despatch Oven Co., Minneapolis, has moved into a new office building.

—o—

Vought & Williams Inc., New York, conducting a steel warehouse since 1879, is terminating business and has disposed of hot-rolled steel stocks to Bushwick Iron & Steel Co., Brooklyn, N. Y.

—o—

Handy & Harman, New York, has available copies of an article, "Silver Alloy Brazing," by Col. Harry R. Lebkicher, commanding officer, Chicago Chemical Warfare Procurement District.

AWARDS . . .

The following firms have won the privilege of flying the Army-Navy "E" flag for excellence in the manufacture of war materials:

Barker & Williamson, Upper Darby, Pa.
Buckeye Tool Corp., Dayton, O.
Commercial Controls Corp., Plants A and B, Rochester, N. Y.
The Coolerator Co., Duluth.
Independent Metal Products Co., Omaha, Nebr.
Mantua Metal Products Co., Woodbury Heights, N. J.
Metal Forming Corp., Elkhart, Ind.
Montague Castings Co., Muskegon, Mich.
Pick Mfg. Co., Plants 1 and 2, West Bend, Wis.
Rheem Mfg. Co., Birmingham plant, Birmingham, Ala.
H. & A. Selmer Inc., Jesse French & Sons Mfg. Division, Newcastle, Ind.
Stolper Steel Products Corp., Milwaukee.
United States Cabinet Bed Co., Brooklyn, N. Y.
United States Rubber Co., Winnsboro mills, Winnsboro, S. C.
John R. Wald Co., Tyrone, Pa.

JAP AMPHIBIAN: This Japanese amphibious tank, captured in Leyte, is the Nips' answer to our "Alligators," "Water Buffaloes," and "Ducks." The Jap version is equipped with detachable pontoons fore and aft which are taken off when the tank reaches land. Aft pontoon is shown at left. Signal Corps photo from NEA

THE BUSINESS TREND

War Output Hampered By Adverse Weather

MUNITIONS production has been hampered recently by temporary embargo on shipment of all goods other than those carrying a government bill of lading, and the shortage of gas and other necessary industrial fuels.

The national steel rate has fluctuated within a narrow range at well below rated capacity for some weeks, reflecting forced curtailment in operations resulting from the shutting off of gas supply at some centers, plus coal and scrap shortages, and further tightening in the manpower situation. Revenue freight carloadings have been well below the comparable weeks a year ago for some time now, with cold and snow restricting freight collections and transfers. Bituminous coal production had recovered by mid-January from the year-end slump caused by the holidays and bad weather. However, output is still below a year ago and the outlook continues bleak. Freight cars are tied up in transit, forcing curtailment in output at some mines due to lack of cars.

Current war output is scheduled to reach $16.2 billion this quarter, compared with $15.8 billion in the final quarter last year. A further slight gain is indicated for the second quarter this year. Some of the key war items still on the critical list include: Heavy artillery and shells, large tanks, heavy trucks, rockets, field wire and airborne radar.

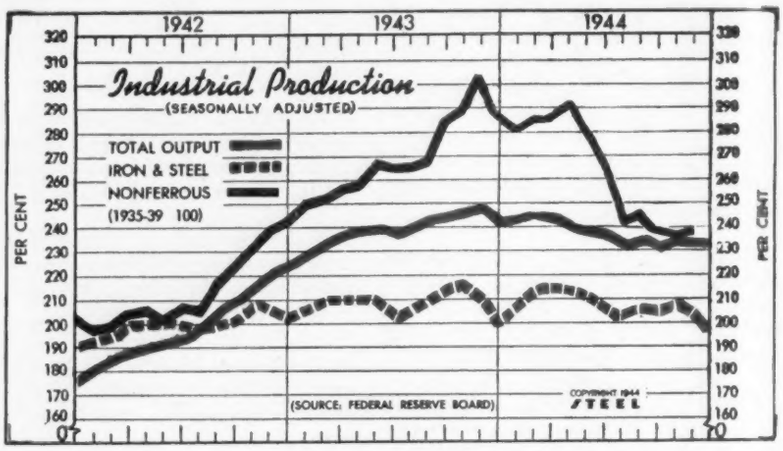
FRB's INDEX — Total industrial production was maintained in December at the level of the preceding month, which was 232 per cent of the 1935-39 average, according to the Federal Reserve Board. The December index figure compares with 241 in like 1943 month and all-time peak of 247 registered in October and November, 1943.

Manufacturing output showed a slight rise during December because of the increased output of war products, while minerals production declined, reflecting a sharp drop in coal output. Gain over the November levels of activity in the machinery, transportation equipment, chemicals, petroleum refining, and rubber industries followed a renewed drive to expand output of critical munitions.

MACHINE TOOLS—Reconversion steps by manufacturing companies will be slowed down by the WPB order halting production of industrial machinery and plant equipment for postwar use. This action was taken to prevent diversion of manpower and materials from urgently needed war production. Since last summer manufacturers have been able to place unrated orders for and get deliveries of such machinery when its output did not interfere with war work.

The backlog of machine tool orders on Dec. 31, 1944, was $260,501,000 of which $200 million represented rated commitments.

Net new orders booked by the industry increased 5.8 per cent during December.



Federal Reserve Board's Production Indexes

(1935-39 = 100)

	Total Production		Iron, Steel		Nonferrous	
	1944	1943	1944	1943	1944	1943
January	242	227	208	204	281	250
February	244	232	212	208	285	252
March	242	235	214	210	286	256
April	239	237	213	209	292	257
May	237	238	210	208	279	266
June	235	236	204	201	264	264
July	231	240	202	204	243	256
August	232	242	203	210	245	264
September	231	244	202	214	239	277
October	232	247	206	215	236	286
November	232	247	201	209	239	304
December	232	241	196	200	...	277
Average	236	239	206	208	...	267

FIGURES THIS WEEK

INDUSTRY	Latest Period*	Prior Week	Month Ago	Year Ago
Steel Ingot Output (per cent of capacity)	93.5	93.5	92.5	99
Electric Power Distributed (million kilowatt hours)	4,576	4,588	4,226	4,524
Bituminous Coal Production (daily av.—1000 tons)	1,975	2,008	1,800	2,108
Petroleum Production (daily av.—1000 bbls.)	4,727	4,734	4,706	4,409
Construction Volume (ENR—unit $1,000,000)	$8.8	$27.7	$23.2	$33.2
Automobile and Truck Output (Ward's—number units)	20,765	20,720	20,005	19,950

*Dates on request.

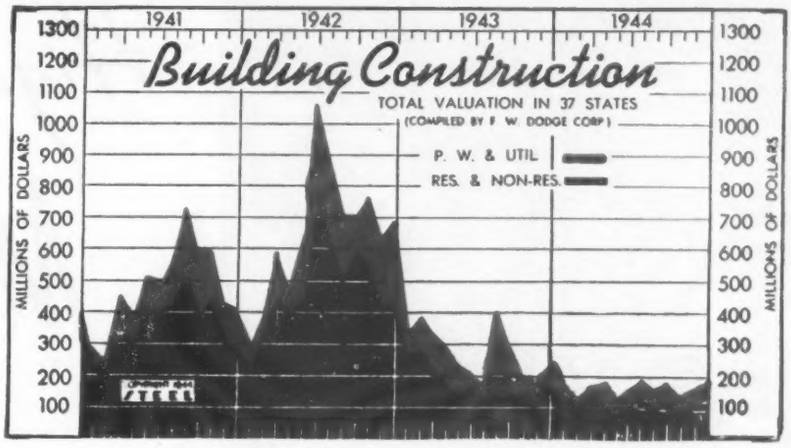
TRADE				
Freight Carloadings (unit—1000 cars)	750†	777	585	811
Business Failures (Dun & Bradstreet, number)	16	16	22	24
Money in Circulation (in millions of dollars)‡	$25,175	$25,209	$25,335	$20,387
Department Store Sales (change from like week a year ago)‡	+13%	+2%	+17%	+4%

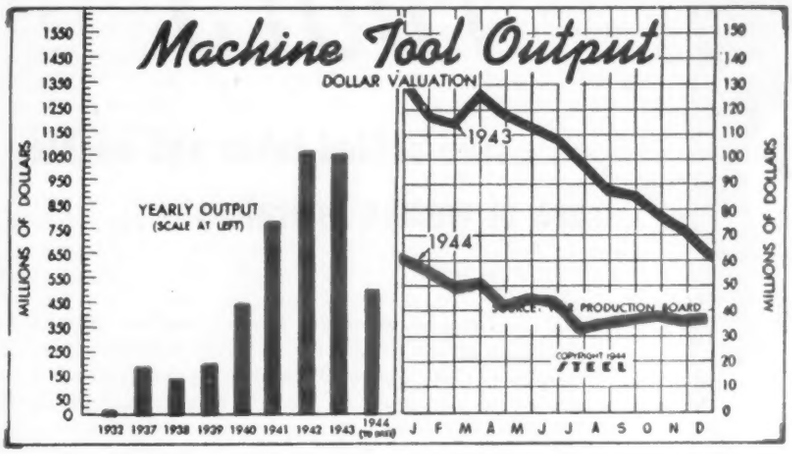
†Preliminary. ‡Federal Reserve Board.

Construction Valuation In 37 States

(Unit—$1,000,000)

	Total	Public Works-Utilities 1944	Public Works-Utilities 1943	Residential-Non-Res. 1944	Residential-Non-Res. 1943
Jan.	159.2	50.3	85.8	108.9	264.3
Feb.	137.2	55.1	112.9	82.1	280.5
Mar.	176.4	61.3	123.0	115.1	216.7
April	179.3	72.0	127.7	107.3	175.6
May	144.2	55.8	95.8	88.4	138.6
June	163.9	70.7	73.3	93.1	156.8
July	190.5	80.5	50.0	110.0	133.7
Aug.	169.3	69.4	73.4	99.9	340.8
Sept.	175.7	64.1	175.1	111.6	125.0
Oct.	144.8	52.2	63.5	92.6	150.0
Nov.	164.9	48.0	59.0	116.9	125.4
Dec.	188.5	66.6	67.4	121.8	184.9
Total	1,993.9	746.0	1,106.9	1,247.7	2,106.4





Machine Tool Output

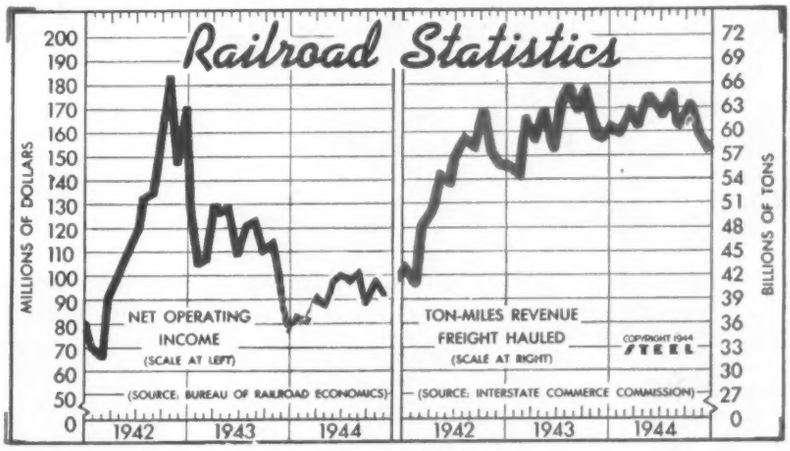
(000 omitted)

	1944	1943	1942
Jan.	$56,363	$117,384	$ 83,547
Feb.	50,127	114,594	84,432
Mar.	51,907	125,445	98,358
Apr.	41,370	118,024	103,364
May	41,819	113,859	107,297
June	41,471	108,736	111,090
July	32,753	97,428	113,596
Aug.	35,177	87,405	117,342
Sept.	35,876	85,842	119,883
Oct.	37,516	78,300	130,008
Nov.	36,277	71,811	120,871
Dec.	36,782	60,861	131,960

Year	
1944	497,438
1943	1,179,689
1942	1,321,862
1941	812,462
1940	450,000

Statistics of Class I Railroads

	Net Operating Income 1944	Net Operating Income 1943	Net Operating Income 1942	Ton-Miles Revenue Freight 1944	Ton-Miles Revenue Freight 1943	Ton-Miles Revenue Freight 1942
	(millions)			(billions)		
Jan.	$82.8	$105.3	$66.8	60.5	55.1	43.0
Feb.	84.5	105.8	64.4	59.3	54.4	40.8
Mar.	92.5	129.7	90.6	63.0	61.2	48.3
Apr.	87.7	128.7	101.6	60.4	59.1	50.0
May	98.5	129.5	109.7	64.0	62.1	54.2
June	99.8	109.0	118.7	62.0	58.0	53.9
July	98.6	127.8	133.6	62.8	63.7	57.0
Aug.	101.4	132.3	135.9	64.5	65.1	58.6
Sept.	89.1	110.3	155.1	61.0	62.5	58.2
Oct.	97.3	113.1	184.8	63.5	65.0	62.2
Nov.	91.6	96.4	149.0	59.4	59.9	57.0
Dec.	....	76.9	174.4	57.0	60.6	55.0
Avg.	....	$113.5	$122.9	61.5	60.6	53.2



FINANCE

	Latest Period*	Prior Week	Month Ago	Year Ago
Bank Clearings (Dun & Bradstreet—millions)	$11,119	$11,371	$9,838	$9,959
Federal Gross Debt (billions)	$233.3	$233.1	$231.7	$172.5
Bond Volume, NYSE (millions)	$58.4	$68.7	$45.5	$72.6
Stocks Sales, NYSE (thousands)	6,818	9,124	6,722	3,716
Loans and Investments (millions)†	$59.6	$59.6	$59.9	$49.9
United States Government Obligations Held (millions)†	$44,393	$44,138	$43,786	$36,352

†Member banks, Federal Reserve System.

PRICES

STEEL's composite finished steel price average	$57.55	$57.55	$56.73	$56.73
All Commodities	104.8	104.7	104.6	103.0
Industrial Raw Materials†	115.8	115.6	115.4	112.3
Manufactured Products†	101.6	101.4	101.3	100.4

†Bureau of Labor's Index, 1926 = 100.

High-Production MACHINE TOOLS

. . . save skilled labor and enable use of women operators

Fig. 1—Greenlee automatic transfer machine lines are employed at several points. This 150-foot machine drills, reams, countersinks and taps all holes in a Cyclone cylinder head at rate of one part every 50 seconds. Savings over standard machines are astounding: 3768 square feet of floor space; one machine instead of 42; $6234 in cost; 15 handling operations; 99 men and 789.7 production hours per 3-shift day; machining time cut from 59 to only 8 man minutes. Here inspector examines a part on the conveyor built into the machine

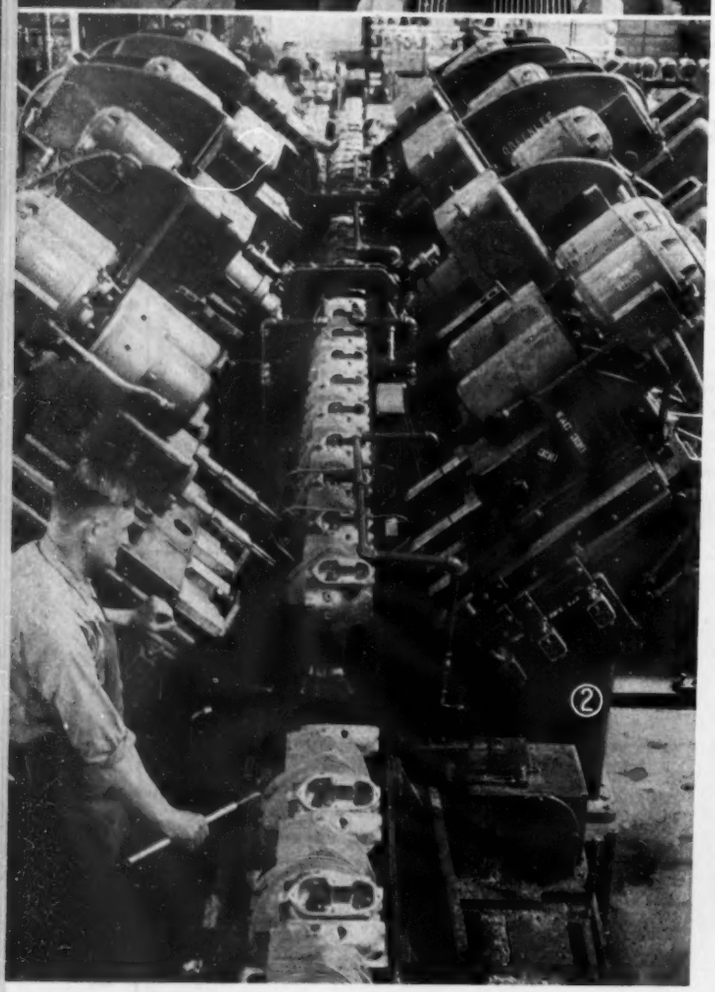
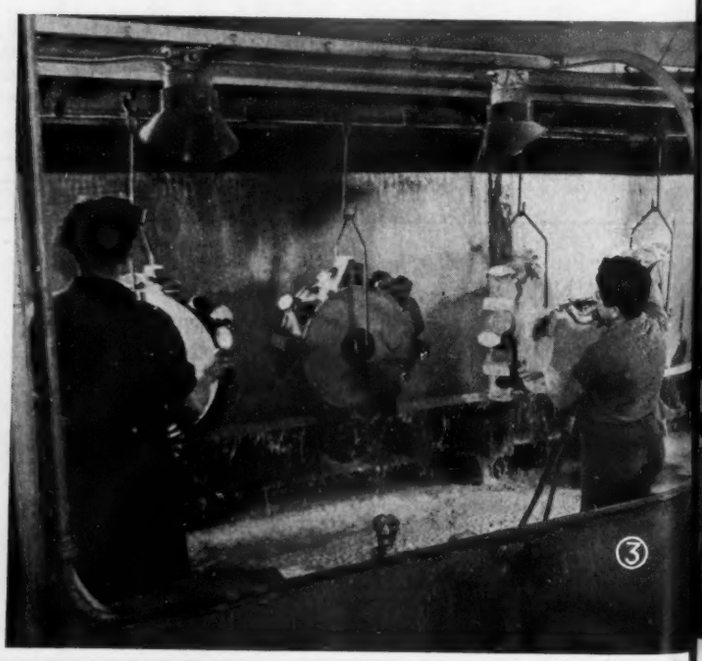


Fig. 2—After cylinder head, barrel, and other components have been joined together, the assemblies go to another Greenlee automatic transfer machine for finish machining. Savings here: 3499 square feet of floor area; 34 machines; $68,500 in cost of machines; 8 handling operations; 103 men and 821 production hours per 3-shift day



HERE are pictured a few of the many special-purpose high-production machine tools now in operation in various plants of the Wright Aeronautical Corp. More than any other factor, this equipment has been responsible for the tremendous increase in the production of Wright aircraft engines.

While the first cost of these machines is naturally high, calculations made prior to the purchase clearly showed that in almost every case this was lower than the cost of the large number of standard machines which would have been required to give an equal work output. In the few cases where this does not apply, the difference in cost will be made up in a few months by lowered production costs.

Of much greater importance than cost, however, is the enormous saving effected in manpower and production hours. For example, the Greenlee automatic transfer machine used for the manufacture of cylinder heads takes the place of 42 standard machines which would require the employment of 107 skilled and semi-skilled workers per day.

Only eight operators per day, working only one shift, are needed for the Greenlee, and since their work consists merely of loading and unloading the machine, these are usually women who have been given only a few days' training. One set-up man is the only skilled labor needed to keep the machine running. A direct saving of 99 persons is thus effected. Similar figures are given under the pictures of other machines shown. All are based on a monthly production of 1000 engines, using a 720-hour month with 20 per cent allowance for contingencies, scrap, and setup time.

Still further savings in manpower are effected in the construction of these tools. In many cases it takes but very little longer to build the special machine than to build one standard machine, and with the saving in machines shown, this amounts to a formidable number of man hours thus made available for other purposes.

The current scarcity of skilled labor has been taken into account in the designing of these special machines, and has been offset by building the skill into the machine itself, leaving the operator little

Fig. 3—Automatic conveyors carry supercharger sections and other parts through paint spray booths. Without additional handling, work goes through baking ovens, two finishing spray booths and final baking ovens

Fig. 4—Closeup of 6-way horizontal and angular 14-station automatic indexing machine for rough and semifinish boring, facing and drilling radial holes in supercharger front housing. Savings from this and similar machine handling finish machining operations: 278 square feet of floor area; 5 machines; 5 handling operations; 17 men and 121 production hours per 3-shift day. While two special automatics cost $25,400 above standard machines, savings in production time make up this difference in 2 months of peak production

Fig. 5—A 4-way tapping and reaming machine features outboard supports for maximum rigidity of tools in reaming, countersinking and tapping the 20 holes in each of 14 cylinder pads on the steel crankcase, a total of 280 holes. Part is turned over for machining upper row of holes. Savings: 1428 square feet of floor space; 9 machines; $33,600 over cost of standard machines and fixtures; 2 handling operations; 28 men and 214 production hours per 3-shift day

Fig. 6—Dual track roller conveyors carry cylinder barrels along double row of Bullard automatics. Individual hoists and jib cranes at each machine do the heavy work, enable women to handle these operations without undue fatigue

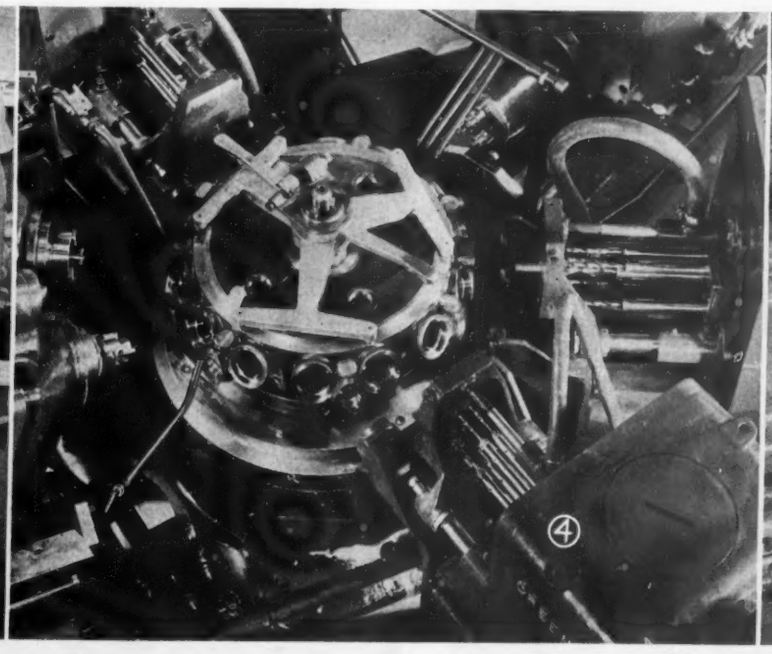


Fig. 7—Overall view of 6-way automatic which drills and back counterbores 20 holes in each of 14 cylinder deck pads on the steel crankcases. Tooling of similar machine shown in Fig. 5. Savings here: 662 square feet of floor area; 4 machines; $32,000 in cost of machines; 2 handling operations; 12 men and 85 production hours per 3-shift day

Fig. 8—Special horizontal Baker drill with manual index and hydraulic feed drills, reams and countersinks 15 holes in governor pad of nose section. Costing $1600 more than standard radial drill, it saves this amount every few weeks by cutting production hours from 24 to only 4.66 per 3-shift day. Note fixture

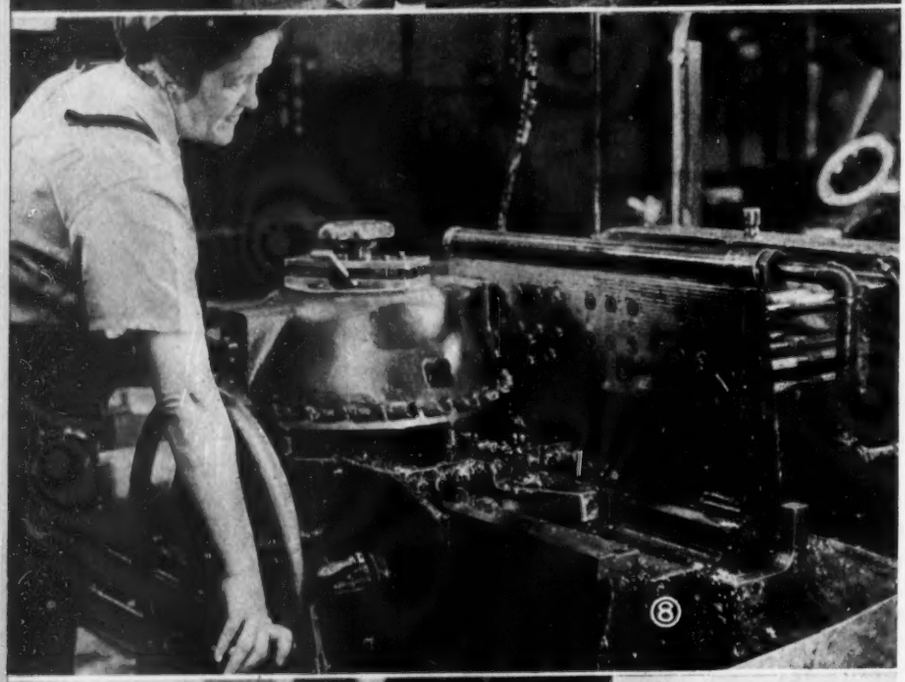


Fig. 9—Power driven oscillating fixture on this Mattison grinder causes the articulated rods to rock back and forth under the concave edge of the grinding wheel; method eliminates burning of the metal, reduces scrap, improves quality of parts, produces more uniform results. Final polishing time cut 11 minutes per rod. Savings: 133 square feet of floor space; 3 machines, 8 men and 123 production hours per 3-shift day. Although costing $14,300 more than standard machines, the automatics make up this difference every 6 weeks through time saved

Fig. 10—Instead of using an 8-foot wrench to tighten crankshaft clamping bolts till they stretch 0.009-inch, this Scandia torque machine does the job much faster, assures exact torque wanted, requires little effort

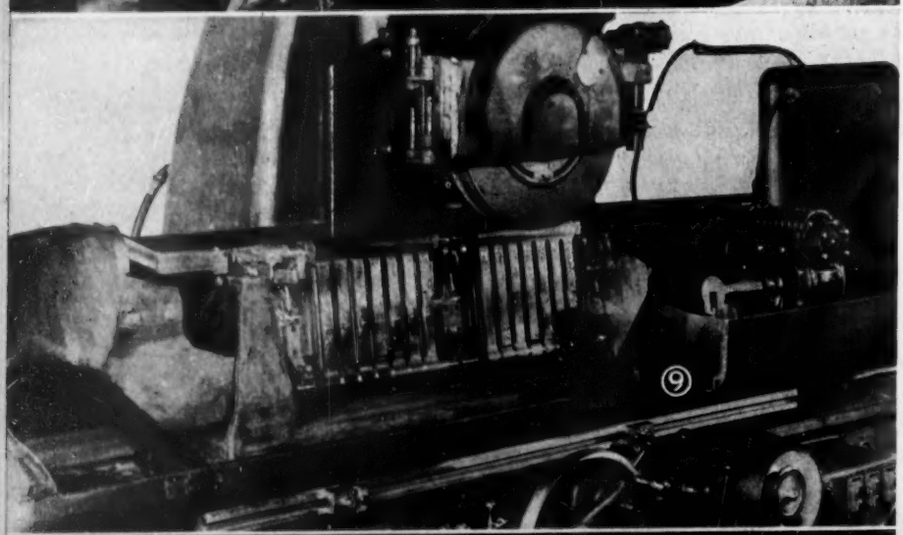
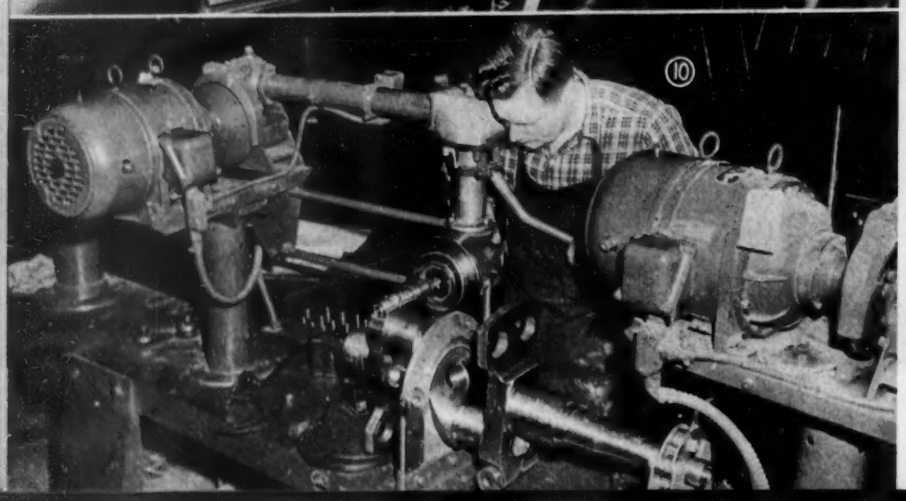
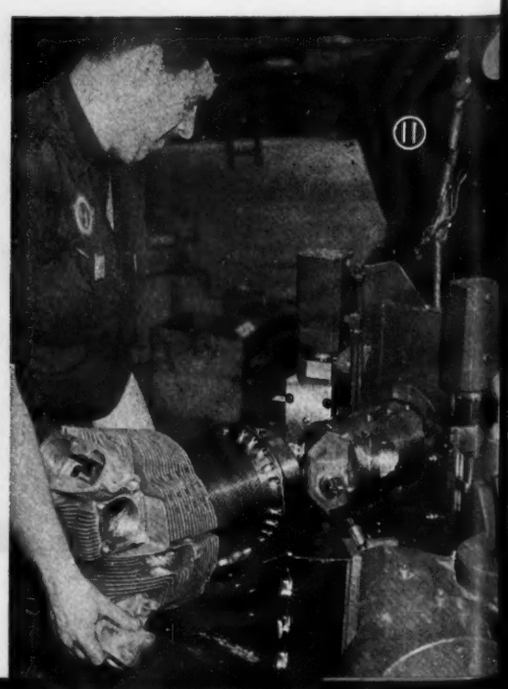


Fig. 11—Operator loading cylinder onto arbor of uniquely designed special Snyder machine. Note arbor tip carries two hydraulically fed cutters for chamfering and spherical back spotfacing spark plug bushings that have been assembled into the cylinder. Savings: 385 square feet of floor area; 4 machines; $27,500 in cost of machines; 1 handling operation; 12 men and 94 production hours per 3-shift day

Fig. 12—Special 5-position Baker drill for drilling, reaming and countersinking 20 hold-down screw holes in flange of cylinder assemblies saves 585 square feet of floor area; 4 machines; $54,000 in cost of machines; 1 handling operation; 12 men and 85 production hours per 3-shift day





else to do than to press the appropriate buttons. Equipment of this type is proving particularly useful where women must be employed, since it does away with much of the mechanical knowledge and trained craftsmanship formerly needed.

One of the main objections to women has been the lack of physical strength for the lifting of heavy parts into and out of machines. This has been overcome, however, through the installation of mechanical lifting devices such as hand or electric hoists at each machine, or by the use of overhead traveling cranes. These not only eliminate the "brute force" formerly demanded but reduce the chances of injury, and also avoid damage

(*Please turn to Page* 156)

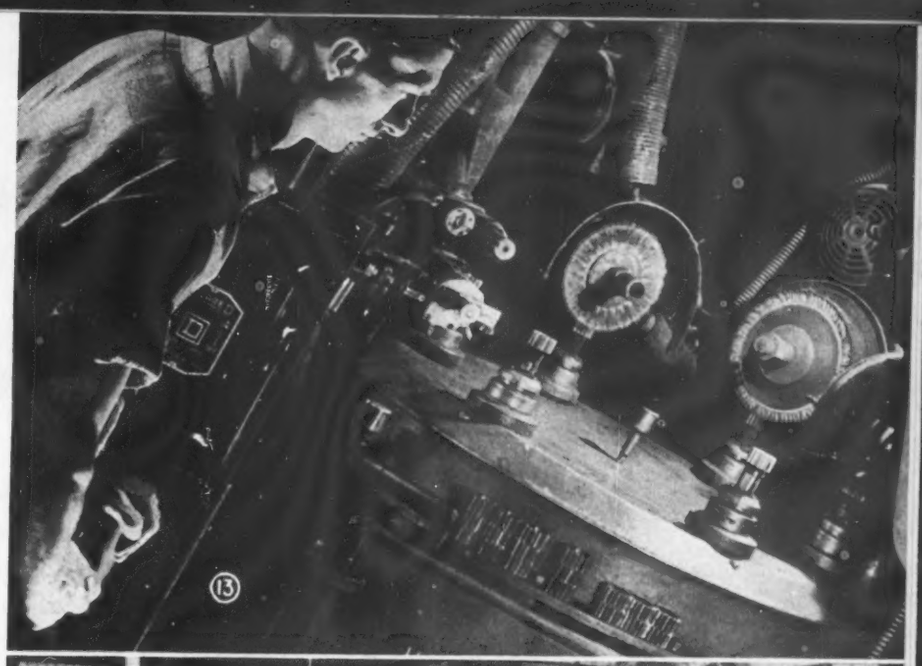


Fig. 13—*Special Hammond polishing machine with six automatically operated spindles polishes reduction gear pinions. Although costing* $5000 *more than standard polishing jack, difference is made up every month by saving* 42 *production hours per* 3*-shift day*

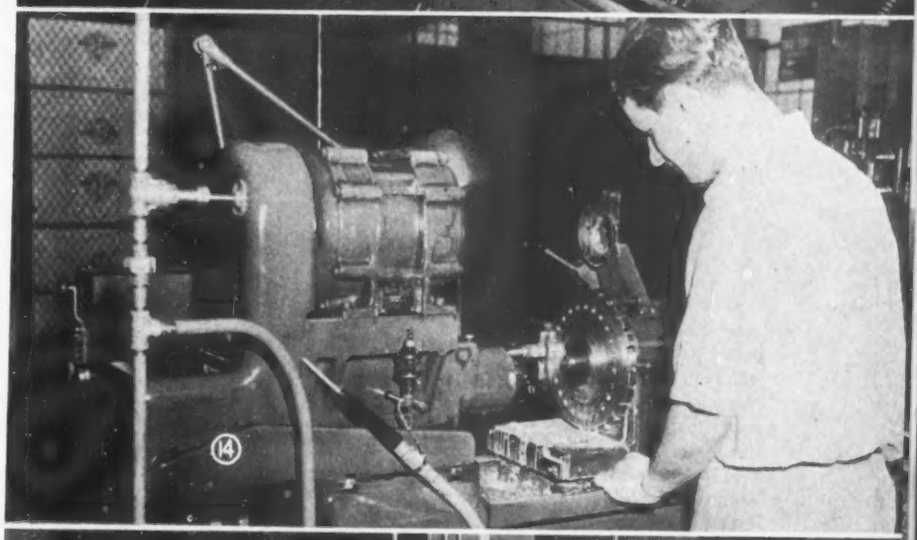


Fig. 14—*Double spindle indexing Ex-Cell-O diamond boring machine finish bores* 24 *holes in flange of propeller shaft. Work is clamped onto indexing plate. Great accuracy and perfect alignment are assured*

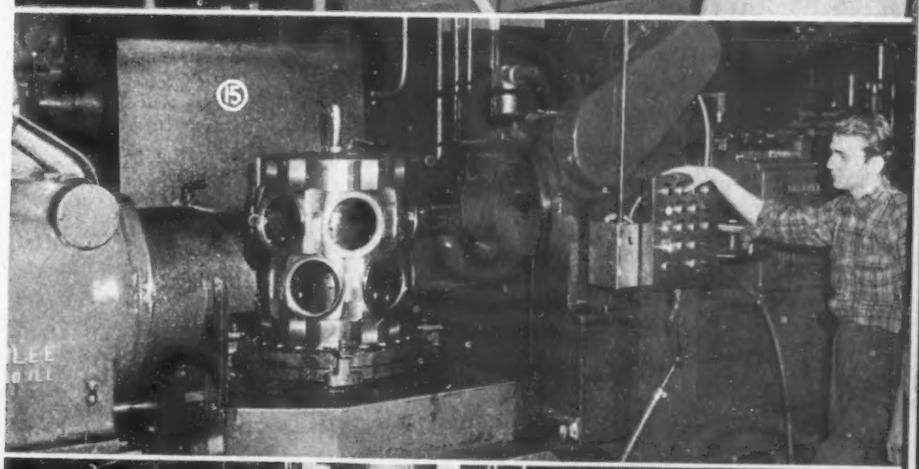
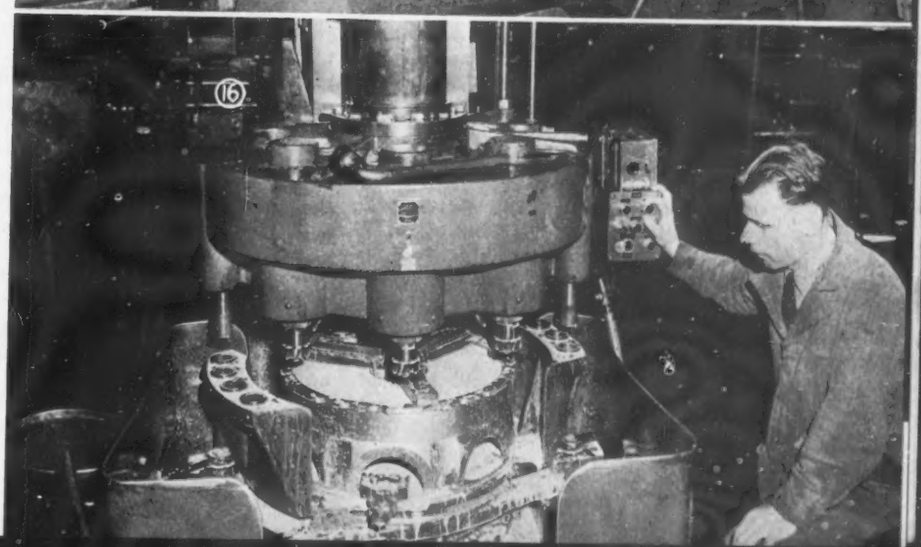


Fig. 15—*Closeup of* 2*-way Greenlee machine which faces, bores and chamfers the* 14 *cylinder deck pads. Right hand head operates on upper row of seven holes, lower row being handled on left hand head. Indexing and operation entirely automatic. Savings on two machines, one for roughing operations, other for finishing:* 3872 *square feet of floor area;* 8 *machines;* $113,000 *in cost of machines;* 2 *handling operations;* 17 *men and* 207 *production hours per* 3*-shift day*

Fig. 16—*Special Barnes drill mills* 28 *scallops around perimeter of crankcase flange, using* 7 *cutters,* 4*-position indexing table. Savings:* 171 *square feet of floor space;* 1 *machine;* $6500 *in cost of machines;* 4 *men and* 35 *production hours per* 3*-shift day*



Construction and Maintenance of Arc Furnace Lining

Shapes should be kept to minimum number. Support of electrode coolers requires careful consideration to avoid cumulative trouble. High-powered modern furnaces have created a demand for brick capable of standing up under high voltages and intense arcs. Metal case magnesite recommended for sidewall lining. Dolomite employed to reduce consumption of chromite and magnesite

By N. F. DUFTY
Metallurgist
Brymbo Steel Co. Ltd.
Brymbo, N. Wales

COST of refractories on a per ton of steel basis is not entirely reliable because poor refractories or carelessness on the part of the bricklayer or furnaceman may lead to increased costs which are not shown as refractory costs. If large masses of refractory, usually containing iron oxide, enter the slag during the refining period, the slag loses condition. Time is wasted restoring slag condition and the quality of the steel will probably be impaired.

Roof Construction. Although the ultimate ideal is a basic roof for a basic furnace, it is not yet a practical proposition. Most arc furnace roofs are built of silica bricks though super-duty firebricks or sillimanite are used occasionally. Silica bricks have several advantages over their competitors: they are comparatively cheap, they have a slight after-expansion, just enough to ensure tightness in roofs and arches, their cold crushing strength is high and they are not liable to damage in handling or in transit. General considerations dictate that the arc furnace shall be circular in shape and it is therefore obvious that the roof must be circular as well though this is a difficult shaped roof to build. Standard shapes can be used but this entails a great amount of chipping and does not give good results in service. In the long run it is cheaper to pay the extra cost of special shapes. A roof built from these shapes is much quicker to construct and there is little danger of patches of brickwork falling in during the initial heating period such as often happens when chipped standard shapes are used.

Extra care taken in the design of the roof is well worth the trouble. The number of different shapes should be kept as small as possible to reduce the cost and size kept down to ensure that the bricks can be thoroughly burnt. Large shapes are difficult to burn properly and cause trouble both to the brickmaker and to the user. The circular roof is an awkward shape and the expansions taking place within the brick as well as the normal reversible thermal expansion alter the contours of the roof and the stresses tend to concentrate at a point about 18 inches from the edge. "Nipping" occurs at this point and pieces of brick drop off just as if they had spalled; this usually happens after 50 to 75 heats. At one particular plant with two 15-ton furnaces, every roof failure in the last three years has been due to this trouble in spite of the fact that the furnaces work continuously. At another shop with two 12-ton furnaces working under unfavorable conditions such as week-end shutdowns and eight hours off every night, the roof life is 50 per cent higher entirely due to better design.

The roof ring is constructed with a flange to support the base of the skewback. Stress concentrations are likely to occur at the toe of the skewback, especially if the roof sags. High temperatures will accentuate the effect of any back. Stress concentrations are likely to collapse may result. To reduce the danger of this it is advisable to build the furnace so that the toe of the skewback is set well back and is not exposed to the full heat of the furnace until the sidewall has been worn right down to the casing. Similar precautions are necessary when building arches, whether these are constructed of silica or basic bricks. If this is done, failure of one or both jambs does not lead to complete collapse of the arch.

The rate of rise of temperature must be carefully watched below 1112 degrees Fahr. and the brick must be hard burnt so that the residual quartz content is low. The relation of the following unfortunate incident will confirm the latter statement. Owing to some mechanical repairs being necessary, it was decided to change the roof of an 18-ton shell runout furnace. After the roof was changed, which took about an hour, the shell was run out for further repairs and it was noticed that severe spalling had taken place, the roof having lost about an inch of brickwork all over; the large blocks used in the construction of the electrode ports, however, had lost between 4 and 6 inches. All the heating that had been given was that from the hot furnace over which the roof had been held for about half an hour. Subsequent X-ray analysis showed that the composition of the brick was roughly 10 per cent cristoballite, 45 per cent tridymite and 45 per cent quartz whereas in a well-fired brick the percentage of quartz should not be much over 10 with approximately equal amounts of the other two minerals. The disadvantage of large blocks is also illustrated by the fact that these spalled more than the smaller shapes used for the rest of the roof.

A new roof on an open-hearth furnace must be heated up carefully and provisions are usually made for soaking at the more dangerous critical temperatures. It has been found in practice that such precautions are superfluous on electric furnaces. The reason for this is probably that if an open-hearth furnace is gassed straight away, the extremely high-temperature flame comes near to the roof, rapid heating results and serious spalling occurs. In the arc furnace, assuming that the charge is normal with a good

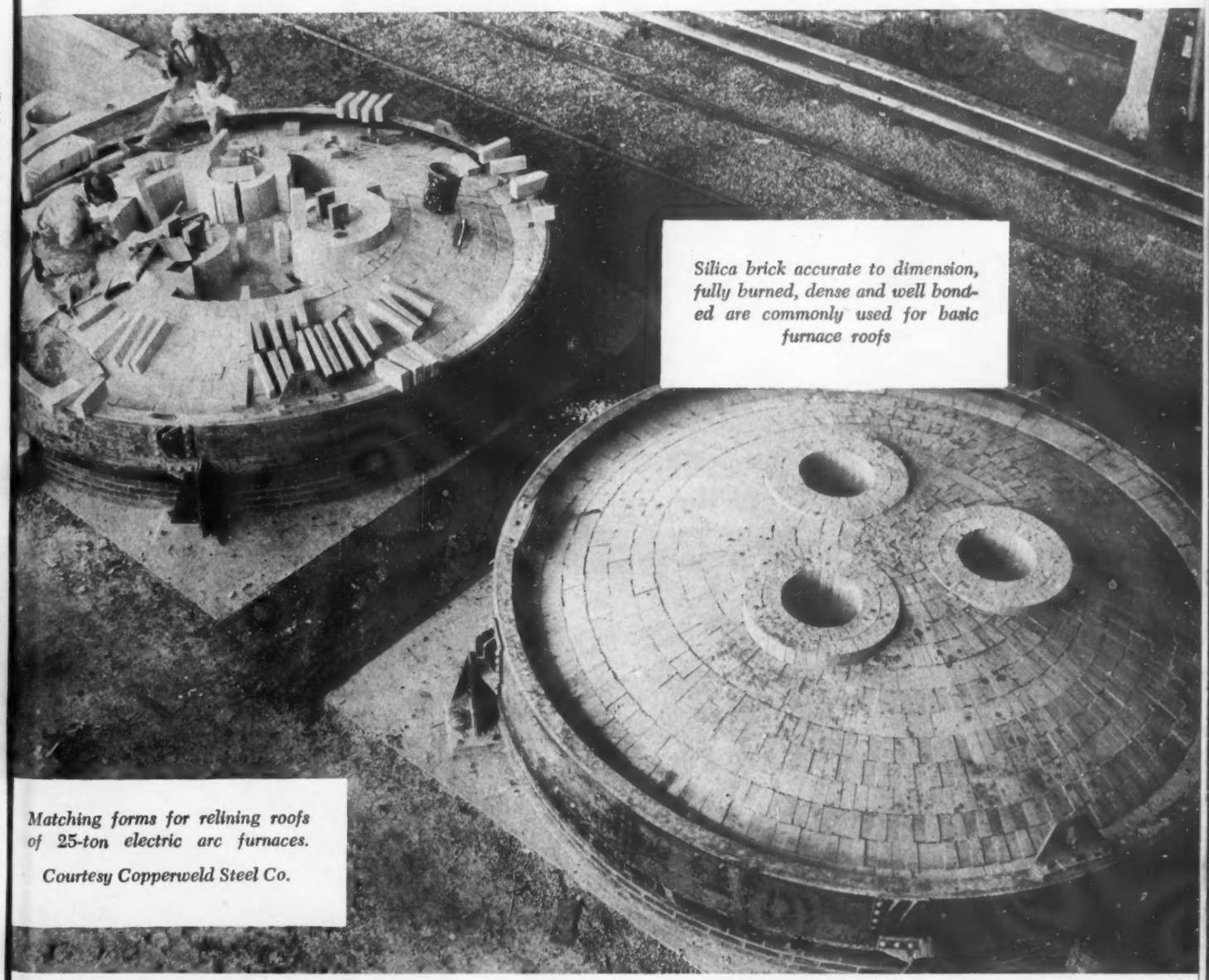
percentage consisting of turnings placed on the top, the arc is struck near the roof but in a few minutes is well buried in the charge and the roof is heated through the dangerous temperature range by heat radiated from the charge as it is heated by the arc from beneath. By the time the roof is exposed to the full heat of the arc it is well into the safe temperature region. Even when melting on 240 volts and 16,000 amperes on an 18-ton furnace no spalling is ever encountered on the initial heating up.

In service, tridymite develops at the hot face and is backed by a zone of cristoballite. The thickness of the tridymite zone is much less than that found in open-hearth roof bricks; this is probably due in part to the thinner roof and steeper temperature gradient and in part to the less oxidizing atmosphere of the furnace. These two minerals have different expansions and also volume changes caused by modifications in the physical structure, at 242 degrees Fahr. alpha tridymite changes to beta tridymite for instance. If the roof is allowed to cool down to atmospheric temperature after a period of service, serious spalling is almost sure to take place due to the above mentioned causes, this is accentuated by the crystal growth which has occurred during use at high temperature. Uniform spalling over the whole roof surface is not as bad as spalling in one place when the weight of the unspalled portion may cause complete failure. If repairs have to be carried out to the sidewalls and the roof is not to be rebuilt, it is advisable to take it off and keep it warm by a gas or oil flame. This precaution usually results in the roof lasting another sidewall campaign whereas if spalling had occurred in the normal place, i.e., at the junction between the tridymite and cristoballite zones, it would not have been worth while attempting to use the roof again owing to the loss in thickness.

In view of what has been said about the susceptibility of silica bricks to spall, it would seem likely that the use of top charged furnaces when either the roof

(*Please turn to Page* 134)

Because of widespread interest manifested at recent steelmaking conferences in refractories for open-hearth and electric furnace bottom and roof construction, STEEL herewith presents an important contribution by an English authority. The author, Norman F. Dufty, until last July, was metallurgist at the plant of the Brymbo Steel Co. Ltd., Brymbo, Wrexham, Denbighshire, North Wales; he now is Acting Pilot Officer with the Royal Air Force. The accompanying paper in two parts, was presented originally before the West of Scotland Iron and Steel Institute, 93 Hope street, Glasgow C2, Scotland. The second installment will appear in next week's issue.



Silica brick accurate to dimension, fully burned, dense and well bonded are commonly used for basic furnace roofs

Matching forms for relining roofs of 25-ton electric arc furnaces.

Courtesy Copperweld Steel Co.

Functions of printing, engraving, stamping, embossing, electrical marking and other kinds of scribing obtainable in diverse and highly specialized machines for . . .

METAL MARKING

Accompanying article enumerates and describes many, if not most, of the tools and equipment—hydraulically, pneumatically, electrically and manually operated—for machine marking of metals and metal parts. Because the use of crayons, talc, paints, etc., is a simple and long-standing means of identification, it must not be inferred that progress in their manufacture and use has halted. Improved hand-marking media of this type, layout dopes, small scribing and etching tools, steel and nonmetallic stamps, stamping dies, and inks will be discussed in STEEL next week.

By JOHN E. HYLER
Peoria, Ill.

MANY different kinds of printing presses and machines have been developed for printing and marking on metal. Variety of materials to be marked and great disparity in types of surface—ranging from flat to globular, in all degrees—constantly are presenting new challenges to makers of such devices, and the refinements incorporated in the new machines signalize the passing of comparably cruder and less efficient models.

One manufacturer making presses for printing many different kinds of sheet materials has provided presses especially suited for printing galvanized sheets. Some of these machines have exceptionally large diameter cylinders (like that in Fig. 1) so that printed trademarks can be located accurately on the sheets. For example, when marking 12-foot sheets which later will be cut up for corrugated culvert stock, the trademark can be located so that it will show at the proper location on the curved culvert surface in each case. Frequently, three trademarks are required across the sheet and lengthwise.

Other sheet-marking processes require a printer with small-diameter printing cylinders. These have been used quite extensively not only for marking steel sheets, but also for aluminum, and from prime stock to scrap in each instance. They can be used to print any one or two of seven colors or white in one operation, and they print in lines only 2½-inches apart. One printing operation simplifies the task of segregating and identifying scrap. Different color combinations are used on various alloys. With the printed lines occurring only 2½ inches apart, even a small piece of scrap is identified instantly. Thus it can be sorted and returned to the mill with all speed. One of these machines appears in Fig. 7.

Other identification also is incorporated in the printing. Block letters are used to indicate a heat-treated sheet, and italics denote annealed sheets. Special fast-drying inks are employed to prevent smearing or offsetting when the sheets are stacked; yet these marks are permanent. In addition to sheet printing, special units have been developed and put into use for printing stainless steel in coils. One company making these various printing presses also has produced machines for marking pipe, tubing, and steel shapes.

Lithographic Template Printing

Another very interesting aspect of printing sheet metals in a press is found in the reproduction or duplication of sheet metal templates. These are especially favored in aircraft factories where large numbers of identical units are required. The unit used is a proof-press model, and is of lithographic type. Where a considerable number of standard templates are wanted, they are printed from a single master. There are two beds on the press, located at a common level. One bed supports a scribed, sheet-metal, master template. On the other bed is held a blank metal sheet, on which the scribed outline is to be duplicated. The

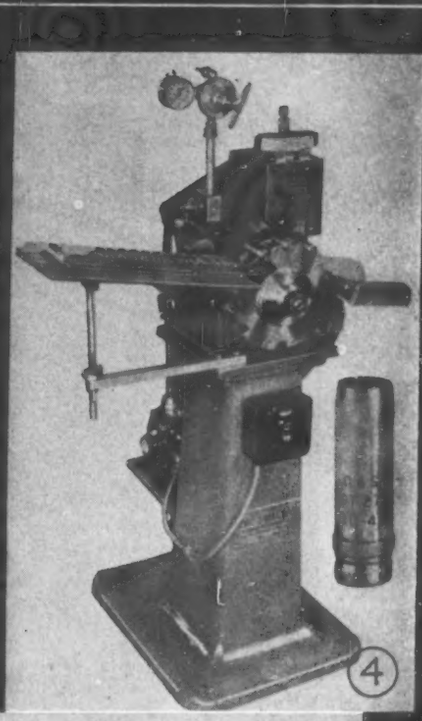


Fig. 1—Press used by Republic Steel Corp. for printing galvanized sheets. Manufacturer is Schmutz Mfg. Co., Louisville, Ky., which also produces the gang printer shown in Fig. 7. Insert is a rocker-mount stamp for printing United States Steel Corp.'s trademark on a special grade of sheets. It is made by Pannier Brothers Stamp Co., Pittsburgh

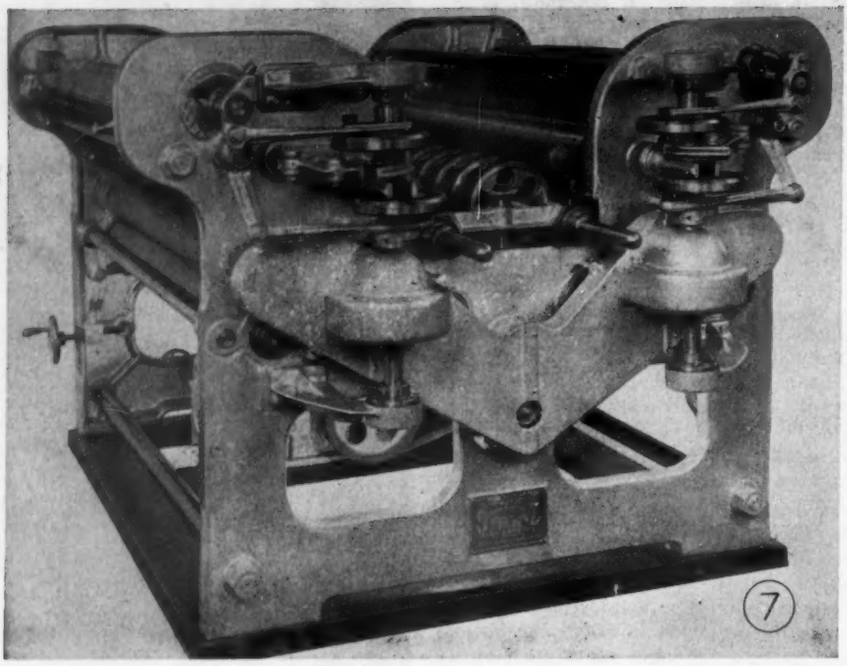
Fig. 2—Universal-type machine arranged for pneumatic pressure and adaptable for many different kinds of work. Note work-holding cradle which permits work to revolve yet remain centered

Fig. 3—Lithographic proof-type press for use by plants requiring large numbers of duplicate templates. Transfers outlines from scribed master to duplicate sheet. Photo courtesy of Chas. Wagner Litho. Machinery Co., Hoboken, N. J.

Fig. 4—Pneumatically equipped machine of vertical-dial type suited for marking work that can be chute-fed

Fig. 5—Machine for horizontal-dial feeding of work with wall thickness to withstand die pressure even though unsupported internally. Hollow parts shown are rolled between pressure dial and marking die

Fig. 6—Power-driven graduating machine for marking conical fuse rings. Pitch and size of marking die are in agreement with that portion of ring to be marked



operator applies ink to the master template, using a separate inking slab and a hand roller for this purpose.

The press shown in Fig. 3 incorporates a traveling, motor-driven printing roll assembly. When actuated, the printing roll travels over and takes an impression from the freshly-inked master, then lifts and reverses its direction to transfer the impression on to the duplicate sheet. The process can be repeated as many times as desired with a given master template. The duplicate impression obtained is black, with the scribed lines appearing in white. Various forms of layouts can be marked on sheet steel in this manner at a high rate of speed, regardless of whether they are templates or not.

Ink-Marking Cylindrical Work

Machines of relatively simple form can be and have been devised for fast-production ink-marking of cylindrical steel parts. Some of these use a straight rubber die, and some use a rotating die of rubber. In either case, the cylindrical parts are revolved while the marking is done. Usually, the part is revolved by frictional contact with the rubber die itself. In the case of one machine, made by Adolph Gottscho, New York, an arm of overhanging design, carrying a flat, inverted die with rubber type on it travels back and forth, actuated by a hand crank mechanism. At the beginning of its forward movement, the die travels over an inking roller. The inking roller rides upon a fountain roller beneath, and the latter dips into a supply of ink in the machine housing. After the inverted rubber die is carried over the inking roller, it continues forward to a point where it engages the top tangent of a cylindrical piece of work. By frictional action, it rolls the work on a perfectly smooth and level bed. By this means, the impression is left with perfect truth on the workpiece. The arm then retracts, under continued manual turning of the crank, and the process repeats over and over again.

In another machine of small size, designed to apply ink to cylindrical work, a synthetic rubber die of rotating style is used. The workpieces in this case have a bore concentric with the outer surface, and are mounted by hand on a small mandrel for marking. As the rotating die comes around into marking position, it engages the work on the mandrel, revolving the work in surface-synchronization with itself, leaving the inked impression on the cylindrical surface. The ink contains just a slight amount of etching acid (sufficient to etch the steel enough that the ink will remain in place, regardless of handling operations and weathering). It feeds to the rotating die from a reservoir in the machine housing. This machine is a product of Acromark Corp., Elizabeth, N. J.

Interchangeable Type Pieces

Various kinds of composite hand and machine stamps feature interchangeable type pieces, so the same tool can be used for making a wide variety of different marks, as the occasion may demand. However, the idea of using interchange-

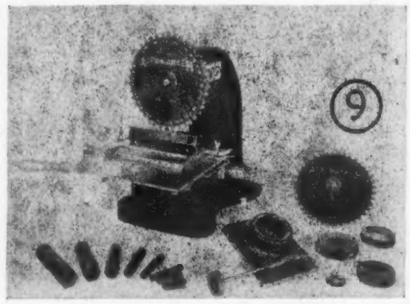


Fig. 7—Special printer widely used on steel and aluminum can print a series of lines only 2½ inches apart entirely across sheets. In addition to making colors available for different alloys, block letters indicate heat-treated sheets and italics signify annealed sheets

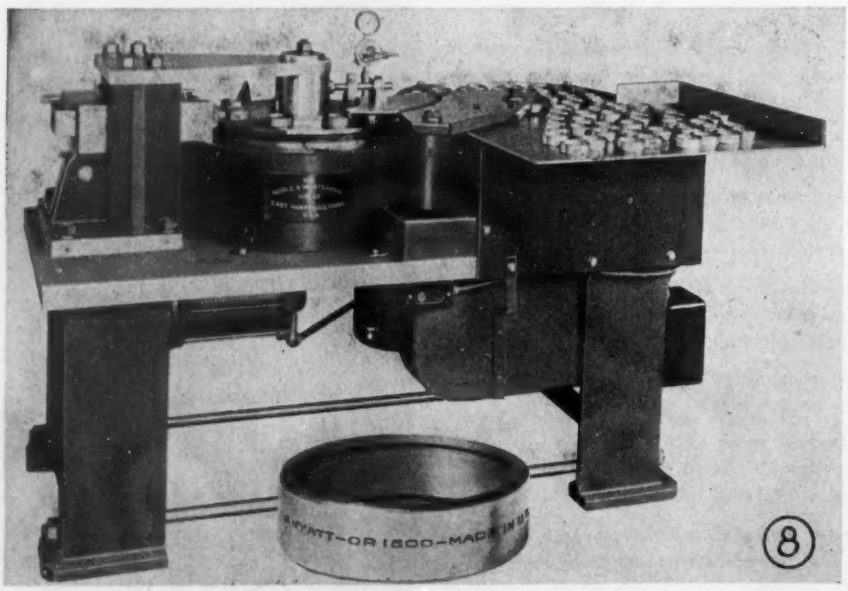


Fig. 8—Production marking equipment for impressing trademark and type number into outer races of bearings before finish grinding. Inscription is 0.020-inch deep. Supporting mandrels are of disappearing type, rising and falling during revolution of horizontal dial, so that pieces can be automatically loaded and ejected.

Fig. 9—An improved machine with interchangeable fixtures for marking gage handles, ring dies, holders, etc. Known as Acromarker Model 7, machine's marking die wheels carry characters easily removed for substitution of special dies. Marks in curved or straight line

Are you Taking Advantage of *this* Carpenter Service?

Here is an on-the-job story of how Carpenter Stainless Strip and the practical knowledge of a Carpenter representative teamed up to overcome production difficulties and lower costs in making Stainless parts.

The inside diameter of the typewriter key rims shown above had to be formed exactly to size so that they fit tightly over the keys. Sharp corners at the base of the tab were essential, since if the tabs were not properly stretched or drawn, the bend would come at a point below where the tab joins the rim. This would have made it impossible to secure a tight fit.

Recommendations of the Carpenter representative helped solve the shop difficulties. And here's what the manufacturer gained by using Carpenter Stainless Strip: 1. Because Carpenter supplied Stainless Strip in long coils to very close tolerances, it permitted faster and more economical manufacture than was possible with the metal previously used. 2. A change-over from non-ferrous metals to Carpenter Stainless Strip also made possible a saving in initial cost of the material because Stainless was 12% lighter in weight. 3. And further, Carpenter Stainless Strip was less costly to ball burnish to bring out the gleaming finish on the part.

It will pay you to investigate the possibilities of applying ductile, easy-working Carpenter Stainless Strip to your new or redesigned products. Your nearby Carpenter representative will be glad to stop in and discuss with you ways of getting the most from this versatile Stainless Strip.

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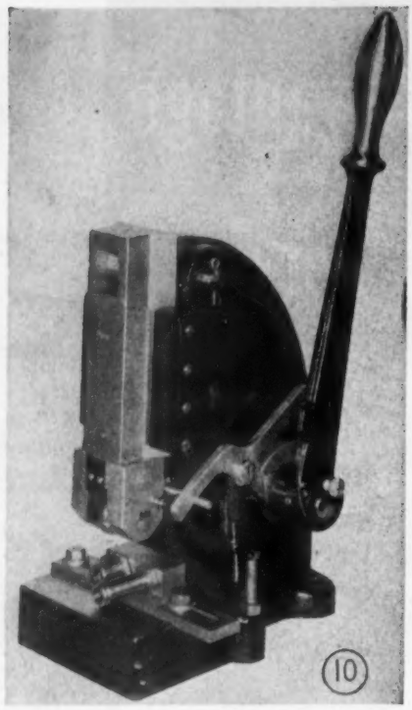


Fig. 10—Hand-lever bench press with automatic numbering head and 2-position fixture for serial numbering spark plug parts

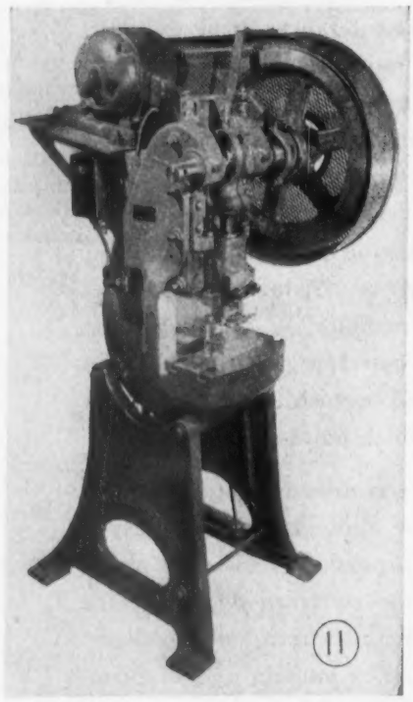


Fig. 11—Motor-driven V & O press fitted with Force Model 23 stamping head with automatic trip and impression anvil. Unit is designed for indenting serial numbers on license tags

able type pieces in a special marking tool that can be applied either to a lathe or to an automatic screw machine, is out of the ordinary. At least one such tool, made by New Method Steel Stamps, Detroit, has been put into use in a number of places. It operates on the general principle of a roller-type die, and is used to advantage for rolling identification markings into wheels, shafts, shell, cylinders, and various other steel parts having a cylindrical surface suited for such marking. A retractive motion is incorporated in the device, so that double-marking cannot occur. It can be used in some cases instead of the numbering machines which are provided for use in presses. However, on work other than that having a cylindrical surface, one of the little automatic numbering machines that can be mounted in a foot or power press, and used either for repeat or automatic consecutive numbering, is often one of the best means available. Sharp, legible impressions in steel are quite readily produced with them. Altair Machinery Corp., New York, specializes in both automatic and nonautomatic units.

Hand and Foot-Operated Units

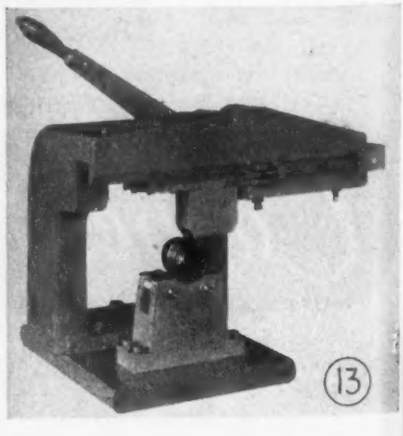
The interchangeable type idea in marking steel parts finds an important and interesting application in another Acromark machine (Fig. 9) which has a staunch disk, mounted on a husky stud for center rotation, with the outer edge of the disk carrying a full selection of letters, numerals, etc. Directly below this disk there is a table, or bed, which holds the work to be marked. A non-rotating arrow, or pointer, is attached to the front end of the stud on which the disk is mounted. On the face side of the latter are placed letters, numbers, etc., which correspond to those on the edge of the adjacent disk. When the disk is turned to the point where one of these characters registers with the non-rotating arrow, it shows that one particular character is in position for marking. This is one of the fastest known methods of selectivity, in handling a wide variety of odd letter and number marking, where the work is not repetitive in any appreciable degree. This is a hand-operated machine.

While various marking machines are designed for hand operation, there are many others that have pressure applied by foot. This is especially convenient where fast handling of relatively small workpieces is involved, since it leaves both hands free for handling the work. Illustrative of this feature is a foot-operated machine, designed for marking identification in nut faces. This is really a foot-operated press, and the ram is provided with a special holder for interchangeable type. A special mandrel suited for the work is provided to hold the nuts being marked.

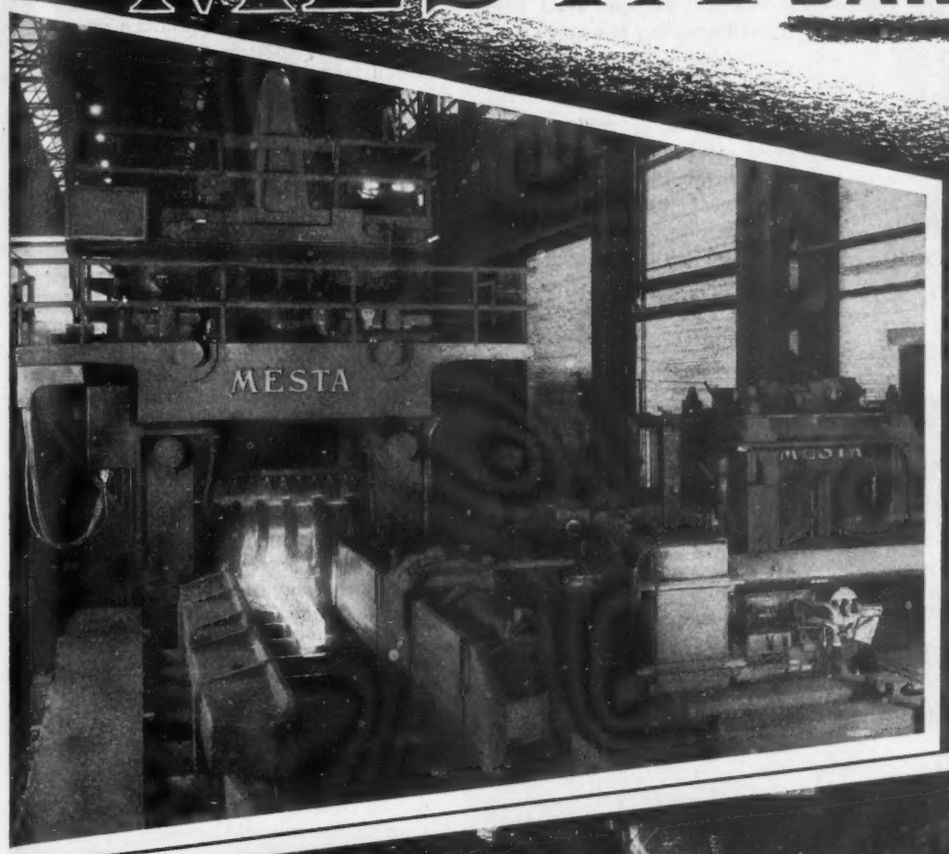
Application of pressure for impressing steel dies or stamps into steel parts is very often by hand or by foot, but there are increasing applications where pneumatic pressure marking equipment is used. This method has the advantage

Fig. 12—Thin-walled tubular parts of small diameter are carried here on long, supporting mandrels and backed up by the pressure dial so that pressure of die cannot bend mandrels. Photos for Figs. 2, 4, 5, 6, 8 and 12 courtesy of Noble & Westbrook Mfg. Co., East Hartford, Conn.

Fig. 13 — Universal bench-type numbering machine tooled with interchangeable type holder for inscription marking of aluminum camera tubes. Machines in Figs. 10, 11 and 13: products of William A. Force & Co., Brooklyn, N. Y.



MESTA BAR MILLS



At the Chicago District's new electric steel plant . . . a Mesta 36" Roughing Mill for supplying billets to the 32" Bar Mill. The Leader, Intermediate and Finishing Stand of this mill are shown below.

The Army-Navy "E" Flag with four stars, flies over the Mesta Plant

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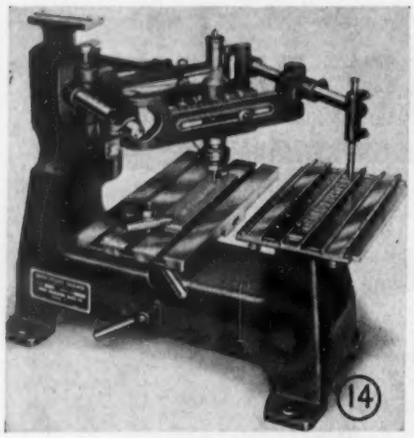

Fig. 14.—Bench-type pantograph unit performs triple service—rotary engraving on metals and other materials, electrical marking on steels, and acid etching. Built by H. P. Preis Engraving Machine Co., Newark, N. J.

Fig. 15—Close-up of pantograph-controlled electric etcher producing exact, permanent markings on ball sockets at rate of four per minute. Etching depth is controlled by amount of electric current used, and width of line by diameter of electrode. Three separate diameters are available

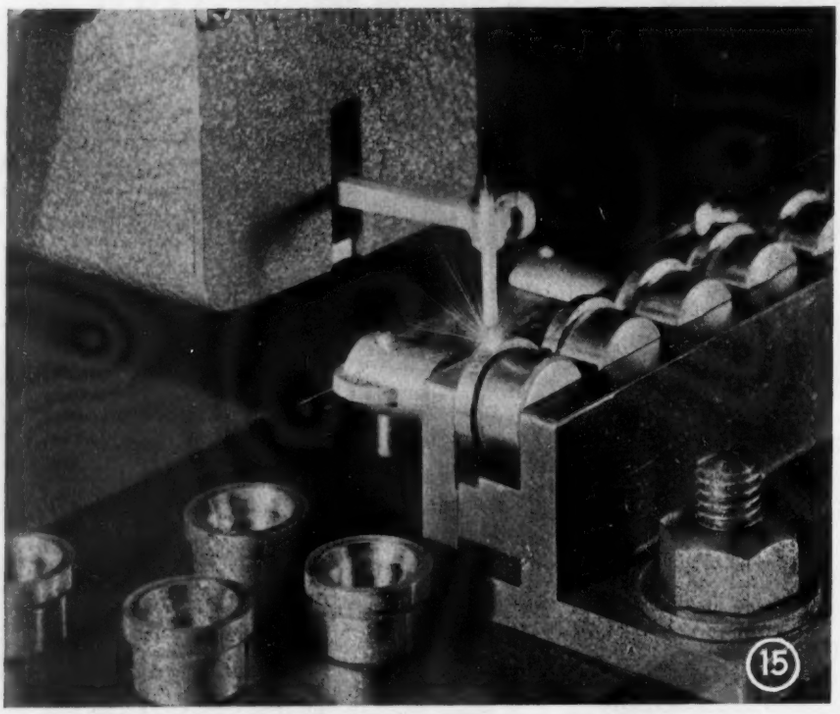

Fig. 16—Etching machine with multiple-head attachment and single pantographic reproduction attachment. Machines of this type will etch variety of contours

that pressure applied will be uniform. These machines often are desirable for marking steel parts with uneven surfaces, or those fragile in construction. They operate from the shop air line. Some of them are designed to produce neat and permanent markings quickly on various metal fabrications. They often are used for the application of instruction data, manufacturers' names, heat numbers, serial numbers, part numbers and patent numbers.

Progressive Rotational Pressure

In impressing steel type, trademark dies, etc., into steel surfaces, there is a very great advantage to devices utilizing the rolling principle. Where a cylindrical piece of work is rolled under a straight-faced die, or where a roller die is used on either a straight or cylindrical piece of work, there is only a very small portion of the type or the die in actual impressive contact with the steel surface at any given instant. It follows that all of the pressure at any given instant is being exerted and localized on a very small area. This results in lowering the pressure required to obtain a given depth of penetration. Naturally, manufacturers of marking machinery for steel have depended heavily on this principle, and some of them have adopted it almost exclusively.

In many marking machines, both standard and special, the required pressure on rolling die action has been obtained by allowing the workpieces to be carried mechanically between the die and a revolving member, having the die so positioned relative to the revolving carrier that there is room for the material to pass through only by receiving the required depth of impression. This is an accepted method, widely applied, but in cases where absolute uniformity of impression depth is important, it has the drawback that any variation in thickness of material being marked, or any irregularities in surfaces, will show up as variations and irregularities in the depth of the impression. This is another place where the value of a pneumatically-controlled die or table movement on a marking machine is demonstrated. The air pressure can be adjusted as desired to provide any depth of marking in a given material of a given hardness. The rolling die then is held to the work by the air pressure, having the ability to advance or retreat slightly, to follow any irregularities or variations of thickness in the material. Thus, uniformity in marking is

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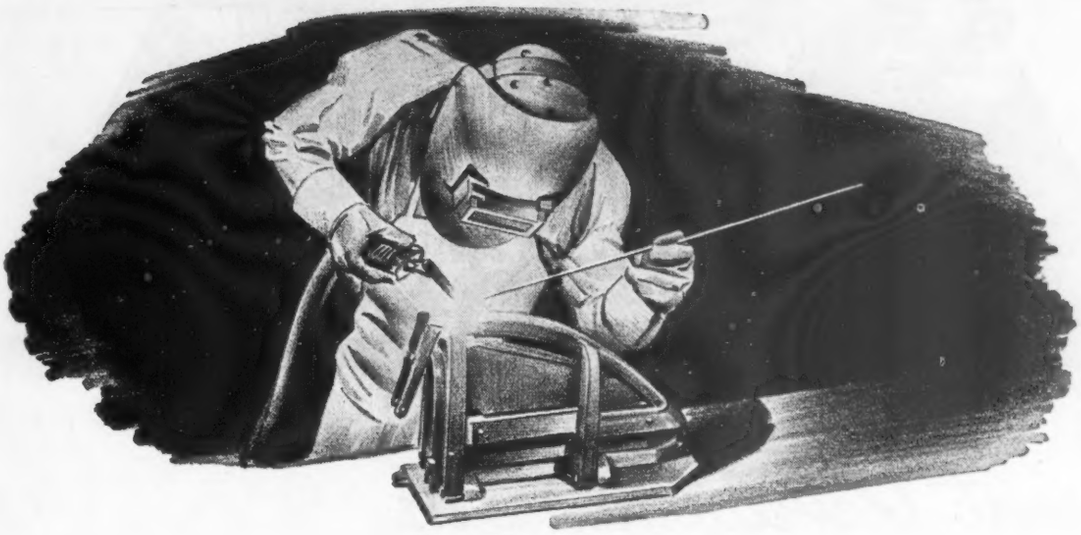
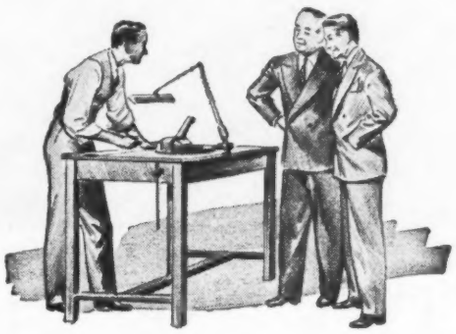


New techniques in working magnesium alloys are changing product ideas



Dow engineers can give you the facts on design—application—and fabrication

Through shop techniques as modern as magnesium itself, this lightest structural metal is now extending its usefulness to wide new fields of application. Freed from outmoded limitations, products are taking new forms in the design trend of today.

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Much of this progress has been contributed directly by the pioneer producer of structural magnesium, The Dow Chemical Company, during 29 years' experience in its own shops and through close cooperation with other fabricators. Results of all this work are now available to you directly from Dow men who participated.

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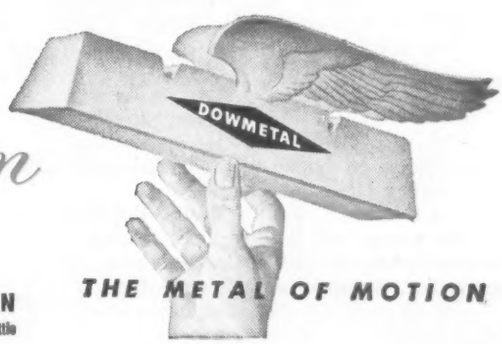

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THE METAL OF MOTION

Recent Developments in FORGING PRACTICE

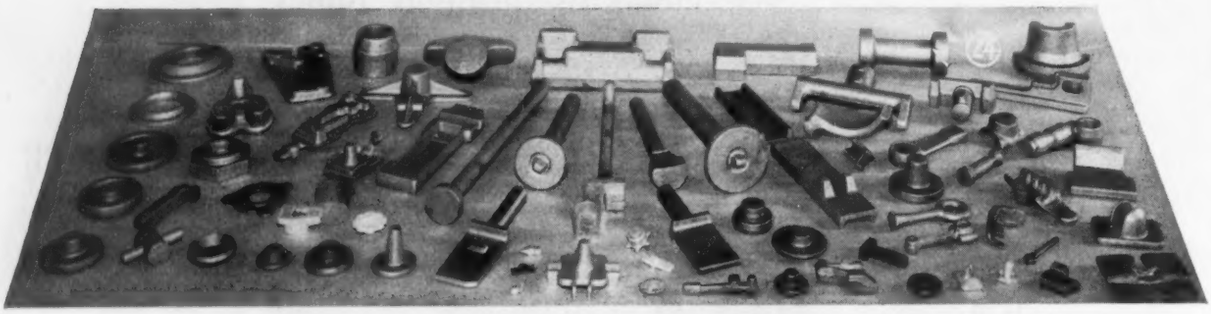

Fig. 23—Samples of small forgings made at General Electric's Lynn River Works
Fig. 24—Variety of small forgings manufactured at General Electric's Schenectady Works

In the third article of their series, the authors describe the types of forging hammers used in General Electric Co. plants as well as the products and materials involved. Other types of equipment, heat treatment and testing methods will be covered in STEEL Feb. 12

GENERAL Electric Co. theoretically classifies forgings into five groups:

Drop forgings made in board and steam drop hammers using closed contour dies.

Hand forgings made on blacksmith's anvils, sometimes with the aid of trip hammers or small steam hammers.

Light forgings made on flat die hammers 2000 pounds or smaller in size.

Medium forgings produced on flat die steam hammers of sizes ranging from 2000 to 6000 pounds. Heavy forgings produced on hammers 4000 and over, including large press forgings.

In this series of articles, only the first four groups will be described. While a description of the equipment used in making the small and medium forgings may also apply to large forgings as well, the details pertaining to the latter will be omitted. Figs. 23 and 24 illustrate a few of the wide variety of small forgings made at General Electric's Lynn River Works and Schenectady Works.

Products and Equipment

The following is a description of forging equipment with particular emphasis being placed on products and equipment at the Lynn River and Schenectady Works. The products include only those made in large production quantities. A complete list would be much too long and detailed to include in this article.

(a) **Board Drop Hammers:** The power for the board drop hammer is usually an electric motor. This, sometimes connected to several hammers simultaneously by means of a belt drive and pulleys, rotates two steel rollers in opposite directions. The lifting device is a board or plank. One end of the board is wedged into the top of the ram.

The other end fits between the two steel rollers which automatically lift board and ram towards the top of the hammer frame. At the completion of the upstroke, the rollers separate automatically and wedges lock against the board, preventing it from falling. The wedges are connected to a foot treadle controlled by the operator.

When the treadle is depressed, the wedges are withdrawn and the ram falls by gravity until the die strikes the object being forged, tripping a lever which

By W. W. DYRKACZ
Works Laboratory
General Electric Co., Schenectady, N. Y.
and
L. B. FONDA
Thomson Laboratory
General Electric Co., Lynn, Mass.

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The manufacturing method employed in the production of Michigan welded steel tube results in a uniformly smooth, scale-free surface.

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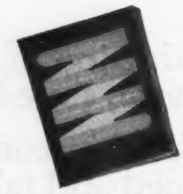
Here are three special parts used in large quantities (two of them run into millions) by a large manufacturer of automotive equipment. They have both war and peacetime application.

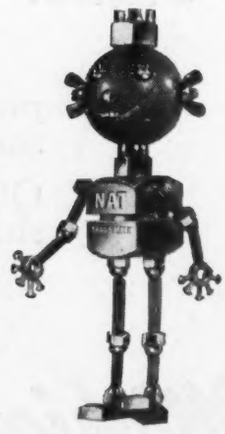
They were originally made milled from bar. When sufficient production could not be obtained by that method, the problem was put up to *National*. We developed an upsetting procedure that met the need for *volume production* and also resulted in substantial *cost reductions*.

You may want to look into the possibilities of saving time and money on fasteners, for present needs or future. Or you may have a problem of fastener improvement on which our engineers can help you as they have many other manufacturers.

Chances are you'll be surprised at what can be done.



Send for a copy of this case history booklet describing briefly, with diagrams, 15 typical instances of time, materials and money saved. Ask for the "Savings" booklet.



National
HEADED AND THREADED
PRODUCTS

THE NATIONAL SCREW & MFG. CO., CLEVELAND 4, O.

brings the rolls together again to raise the board and repeat the operation.

The operator can deliver each blow individually, or by leaving the treadle depressed, cause the entire operation to repeat itself automatically for any desired length of time.

A board hammer in operation at GE's Lynn River Works is shown in Fig. 26. Precision work on small articles can be turned out with this hammer by use of carefully matched closed contour dies. Board drop hammers are generally available in sizes up to a hammer weight of 5000 pounds. Larger board drop hammers are not considered safe because of the nature of the lifting arrangement.

At the Lynn River Works General Electric has 27 board drop hammers in operation ranging in size from 500 to 3000 pounds. Products of these hammers include forgings of the following various types:

Name of Part	Material Used
Turbine buckets	Stainless type 403
Turbine governor weights and knife edges	SAE-1020 for carburizing
Eyebolts	SAE-1020
Rings (thrust washers, thrust collars, etc.)	SAE-1020
Brackets and clevises	SAE-1020
Mounting flanges	SAE-4140, NES-8744
Spring spacers	SAE-1020
Oil nozzles	SAE-1020
Commutator poles	SAE-1020
Box sledging wrench	SAE-4150
Couplings	SAE-1045
Clams	SAE-1020
Motor feet	SAE-1020

There are 9 board drop hammers in operation in the Schenectady Works, rated from 800 to 2500 pounds. Typical forgings manufactured in these hammers are as follows:

Name of Part	Material Used
Field poles, clamps, wedges, bearing retainers, supports	SAE-1020
Eyebolts, connecting rods, clevis ring gears, trunnions	SAE-1045
Box sledging wrenches	SAE,-4140, NES-9435-45 incl.
Space blocks	Stainless type 302, NES-8640
Latches, brackets	Stainless type 302
Toggle links	Stainless type 410
Valve plates	Stainless type 416
Switch blades, contacts, contact tips	Tough pitch copper
Frames	SAE-1050

(b) Steam Drop: The steam drop hammer is in some respects superior to the board drop hammer. Its higher speed and controlled blow are especially desirable in certain operations. It is available in larger sizes, but is more expensive to operate than the board drop hammer.

In construction and operation, it is basically similar to the board drop hammer except for the lifting device. The board is replaced with a piston rod and the mechanism which lifts the rod and ram consists of a steam cylinder and piston. However, besides lifting, the steam is also utilized for driving the ram downward upon the work, whereas

(*Please turn to Page* 166)

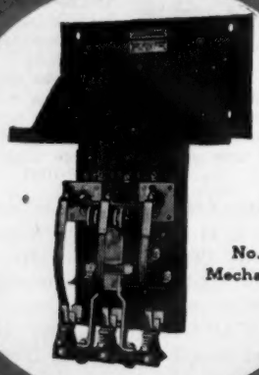
Fig. 25—*850-pound manually controlled steam hammer used to make small hand forgings.* (*General Electric's Schenectady Works*)

Fig. 26—*800-pound board drop hammer for making stainless steel buckets used in turbines* (*General Electric's Lynn River Works*)

Fig. 27—*5000-pound air hammer* (*General Electric's Schenectady Works*)

E&M PUSH BUTTON

No. 1
ZEO



No. 2
Mechanism

No. 2
ZEO

BULLETIN 1065-A FULL VOLTAGE OIL-BREAK STARTERS FOR 110-550 VOLT MOTORS

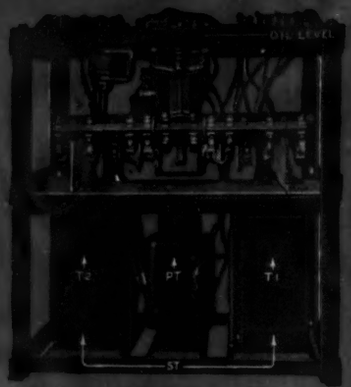
No. 1, 2 or 3
ZEC

No. 1
Compensator-Mechanism

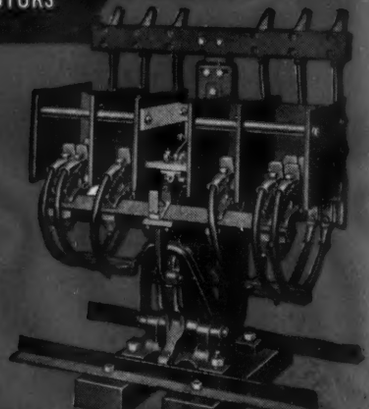
No. 0
ZEC

BULLETIN 1045-B REDUCED VOLTAGE OIL-IMMERSED STARTERS FOR 110-550 VOLT MOTORS

No. 30
ZEHC



Bulletin 1047-C Compensator-Mechanism for 2300 Volt Motors



Bulletin 1082-C
Contactor for 2300 Volt Motors
(30,000 KVA Interrupting Capacity)

STARTERS

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TYPE EO PUSH BUTTON BULLETIN 1105-C
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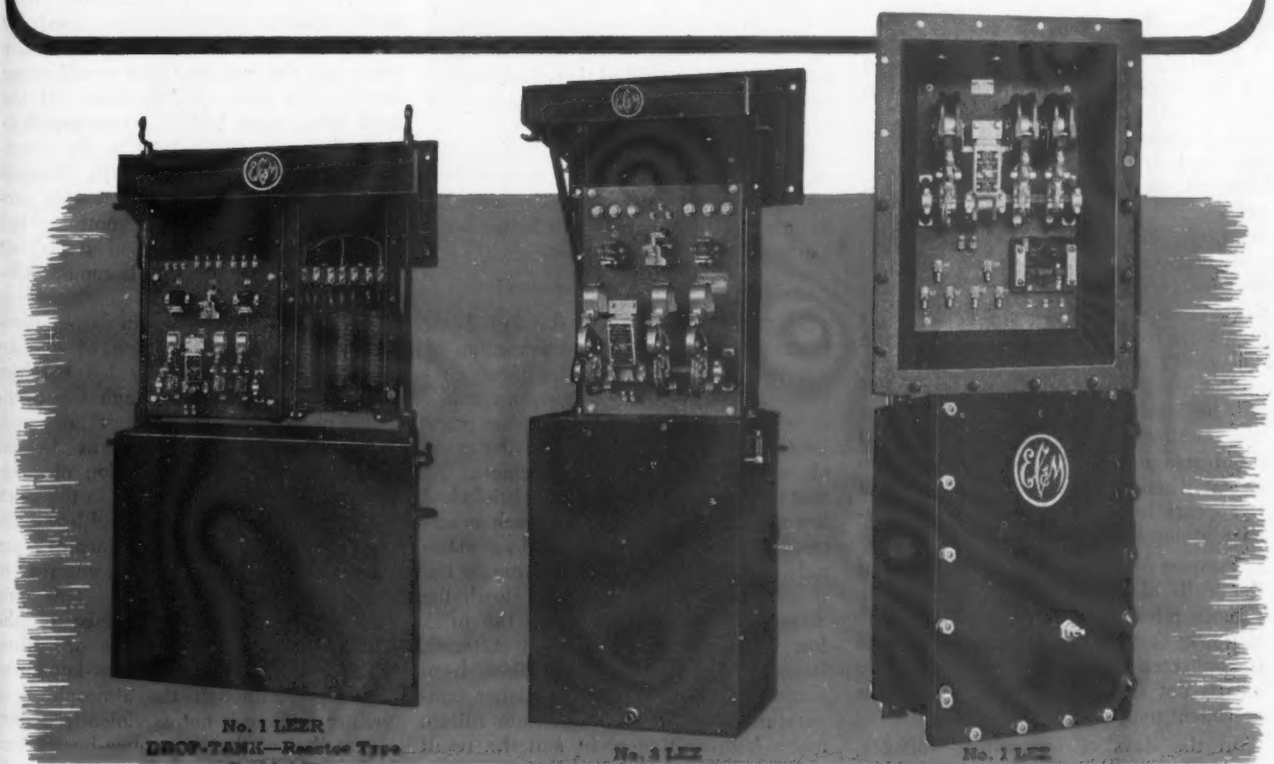
Pictured on these pages are several forms of EC&M starters for the successful operation of both low and high voltage squirrel-cage motors. Each starter-mechanism is of substantial construction for long periods of operation without attention. Completely enclosed, only an occasional "opening up" for inspection is required.

The Type EO Push Button is without equal for remote control of starters in explosive atmospheres and is also used by many plants for turning lighting circuits on and off in dangerous areas. It is compact, has heavy contacts of simple construction and can be used with or without oil.

Our nearby office will be glad to supply complete information. Specify by individual bulletin numbers or, for a complete set, ask for "Class 1, Group D Literature."



No. 1 LEZR
DROP-TANK—Reactor Type
Booklet 88

No. 3 LEZ
DROP-TANK—Full Voltage Type
Booklet 88

No. 1 LEZ
AIR-BREAK—Full Voltage Type
Bulletin 1067-A

THE ELECTRIC CONTROLLER & MFG. CO.

2698 EAST 79TH STREET — CLEVELAND 4, OHIO

Arc Furnace Lining

(*Continued from Page* 119)

is removed from the shell or raised and the shell run out from beneath, would cause a certain amount of spalling. There are two main reasons why this does not happen. The roof and shell are parted for so short a time that the cooling down does not carry the brick through the dangerous temperature area and also the depth of penetration is low. Strains set up by the cooling of this thin layer of brick are insufficient to cause rupture.

On some furnaces the heavy electrode coolers are supported by a spider and on others the weight of these coolers is directly on the roof. Although the refractoriness of silica under load is good, the weight imposed by the coolers is often sufficient to lower the refractoriness sufficiently to cause serious fluxing of the electrode ports. These wear back, leaving a still smaller area to support the same weight and the trouble is cumulative. The passage of hot gases past these bricks aggravates the matter as they carry iron oxide during the melt and lime dust later on in the heat. Unless carefully watched, the ports increase in diameter until they allow the cooler to slip through leaving it suspended over the bath by its supply pipes and usually in the middle of a heat. It is generally possible to work the heat out by supporting the supply pipes on a heavy wooden plank soaked in water and laid along the roof, holding the cooler at the other side by means of silica wedges.

Some Bricks Have Drawbacks

Materials other than silica are used for arc furnace roof construction, sillimanite and superduty firebricks being the most popular. These bricks are refractory and are resistant to spalling but have two serious drawbacks, they are expensive and have a low refractoriness under load. In certain cases they can compete economically with silica. A small foundry furnace working an eight hour day will impose severe spalling conditions on a silica roof and firebrick or sillimanite will give a much better life, particularly as the weight of brickwork in the roof will be insufficient to cause softening at the working temperature. An additional disadvantage in the case of sillimanite is that when used in a basic arc furnace it appears to absorb lime from the furnace atmosphere.

Furnace Sidewalls. When speaking of the walls of a furnace, the part of the furnace referred to is the wall above the slag-line, that portion below the slag-line is unaffected by the furnace atmosphere and is not subject to high temperatures or violent temperature fluctuations.

In the days of lowmelting voltages, sidewalls were not much of a problem and silica was used successfully. The use of high-melting voltages and therefore longer and fiercer arcs, made it necessary to find another refractory which would stand higher temperatures than silica and which would withstand the attack of basic oxides. Consider a modern 15 to 18 ton furnace melting on 240 volts and 16,000 amperes; as soon as the scrap has melted off the banks the melting efficiency must be reduced by dropping down on to a low-voltage tapping. If this is not done, the flame from the long, high-voltage arc melts the sidewalls just above the top of the banks. This runs down and reacts with the lime and magnesia to form low-melting point silicates such as diopside and others containing iron oxide as well. As this melt permeates to the lower portions of the bank, further reactions occur with the formation of more basic and more refractory silicates, forsterite for example. Iron oxide will naturally be present and complicates the problem still further.

However, by careful repairing, strong banks can be built up, the effect of the silica drip from the walls being to help in their formation by reacting with basic oxides present to form a high-temperature bond. In time the sidewalls are undermined and fall into the bath as they become top-heavy. This is serious enough from the point of view of sidewall life but the effect of part of a silica wall on the slag has to be seen to be believed. Time is wasted restoring the slag to condition and extra deoxidants are needed, the quality of the steel is bound to suffer by the entry of oxide-bearing materials into the slag. If the wall collapses after tapping, all the bricks must be laboriously raked out to avoid damage to the furnace bottom. Heavy-walled cooling pipes can be embodied in the wall at the danger points but this is an unsatisfactory solution as the thermal efficiency of the furnace is reduced by the heat losses in the cooling water and there is the ever-present danger of hydrogen pickup in event of the pipes leaking.

In view of the obvious failings of silica bricks in high powered modern furnaces, the case for basic bricks must be examined to see if they give better service to offset their higher cost.

Magnesite Type Improved

Magnesite bricks were the first basic bricks to be used in the construction of arc furnace sidewalls. The chief constituent of the brick, magnesium oxide, is extremely refractory and has the property of absorbing large amounts of iron oxide without losing its refractoriness. At that time,commercial magnesite bricks had low melting point compounds such as serpentine and diopside as bonding materials. This caused a serious drop in the properties of the brick under load, the magnesite was unaffected but the brick lost cohesion when the bond softened. Recently magnesite bricks have been made with forsterite as the higher temperature bond. This magnesium silicate has a high-melting point and the result is a much better brick. Another objection to earlier types of magnesite brick, their low resistance to thermal shock, has largely been overcome by improvements in the purification of the raw materials and careful attention to grading. It is unfortunate that just as these improvements were encouraging the use of magnesite bricks, the war made it necessary to look to our domestic sources of basic material for our sidewall refractories.

Metal-cased magnesite is probably the best sidewall lining and lives of over 300 heats have been obtained in a 35-ton arc furnace. Magnesite is rammed into steel tubes which are set in magnesite cement; an alternative method is to press blocks in 9-inch long pieces of 4½ x 3-inch angle iron and set them as ordinary bricks. The steel forms a satisfactory low to high-temperature bond as it retains its rigidity at the cold end and at the hot face oxidizes to ferric oxide and combines with the magnesite to form magnesio-ferrite which has a melting point of over 3092 degrees Fahr., some FeO-MgO solid solution is also formed.

Chromium Pickup a Problem

Chrome bricks have long been used as a neutral course to separate acid from basic bricks. In furnaces where silica walls are used two courses of chrome bricks are usually put beneath the silica and on top of the magnesite bricks of the lower sidewalls. Until recently chrome bricks were characterized by their extremely low refractoriness under load in spite of the high melting point of the spinel chromite, the main constituent of the brick. As with magnesite, this was caused by the presence of low melting point magnesium silicates in the bond. Again, the same remedy is effective, the addition of sufficient magnesite to stabilize the silica as the refractory dimagnesium silicate, forsterite. Normally, chrome bricks are not used for complete sidewalls as the entry of any brick into the reducing slag would cause the bath to pick up chromium. If the steel being made had a narrow specification, this may easily lead to the rejection of the cast. Forsterite bonded chrome bricks have been used with success in furnaces making nothing but stainless and high-chromium steels but their use is unlikely to become widespread.

Good results obtained in basic open-hearth furnaces by the use of chrome magnesite bricks naturally led to their use in arc furnaces, although the properties of the brick under test are good, the same objection arises as before, chromium pickup. Absorption of magnetite by the chromite grains in the brick causes these grains to grow and low melting point magnesium silicates are squeezed backwards and concentrated in a zone behind the hot face. This zone softens seriously and the face of the brick, which shows no signs of fusion, drops off; this phenomenon is known as bursting. Although the atmosphere of the arc furnace is not as violently oxidizing as that of the basic open-hearth furnace, failure by bursting is still a problem. In addition, a reducing atmosphere, such as occurs during the refining period, causes a diminution in high-temperature strength and also a 3 per cent expansion between 1472 and 1832 degrees Fahr. Service trials indicate that

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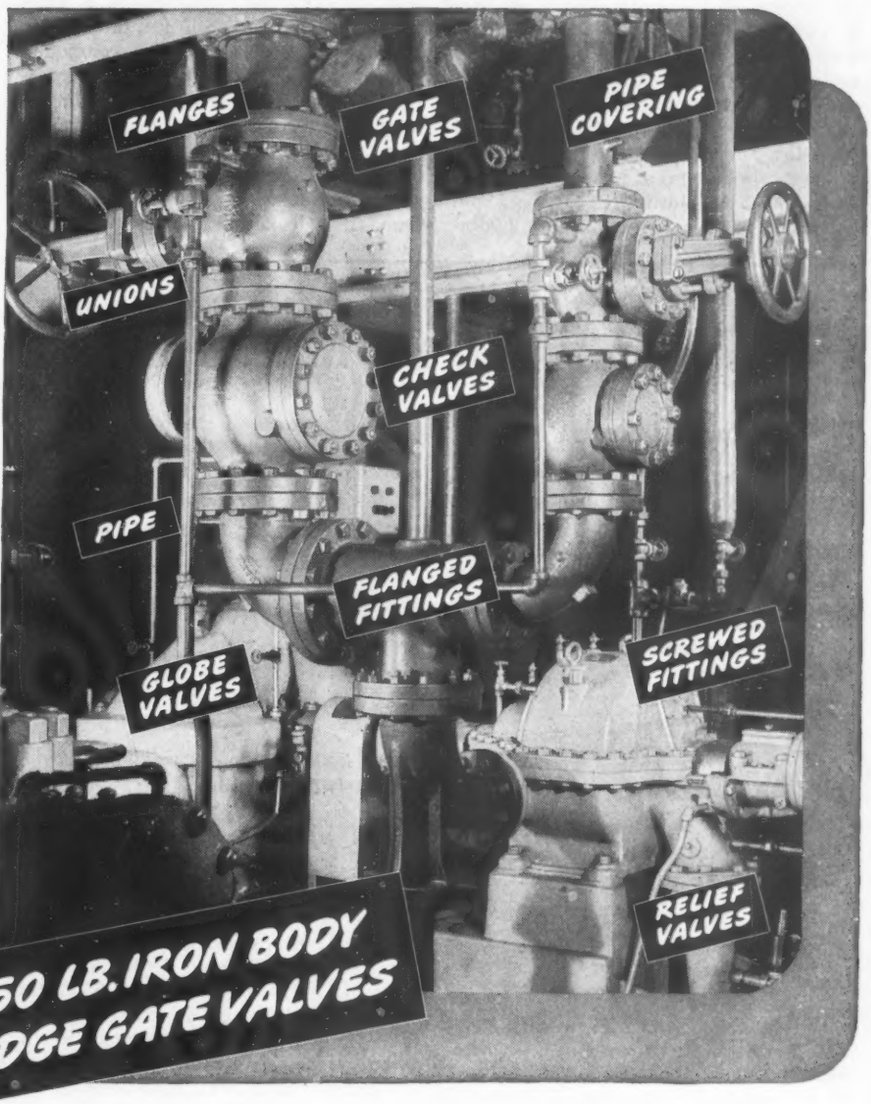
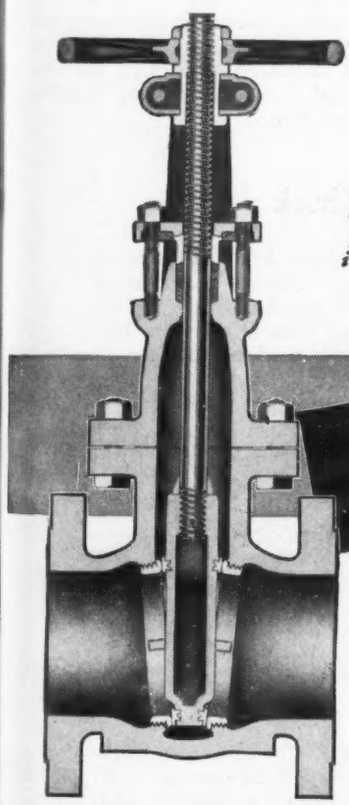


Pump discharge piping in industrial plant.



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chrome magnesite bricks give a good life but not sufficient to warrant the use of strategic materials such as chromite when domestic bricks are available.

Dolomite should be used to reduce the consumption of chromite and magnesite. Dolomite is a double carbonate of calcium and magnesium and when burnt consists of calcium and magnesium oxides. The temperature necessary for the dead burning of the former oxide is commercially unattainable and so ordinary burnt dolomite is susceptible to hydration on account of the large amount of lime it contains. The manufacture, transport and storage of dolomite bricks presented many problems to the brickmaker and these have only recently been overcome. Chesters and Swinden have dealt with the manufacture and properties of dolomite bricks in a paper before the Iron and Steel Institute. The general outline is as follows:—to prevent hydration of the free lime it must be stabilized as tricalcium silicate by the addition of silica or some compound containing silica. Serpentine is a convenient mineral to use as it also increases the magnesium oxide content of the brick. Reaction occurs between the dolomite and the serpentine during firing according to the following equation, $6(CaCO_3.MgCO_3)+3Mg O. 2 SiO_2. 2H_2O = 9 MgO + 12CO_2 + 2H_2O + 2(3CaO.SiO_2)$. A slight excess of serpentine is added as too little leaves some lime unstabilized. This slight excess leads to the formation of a small amount of dicalcium silicate, the beta to gamma transformation of this compound is accompanied by a 10 per cent expansion so this is prevented by adding a small percentage of stabilizer, usually borax. Tricalcium silicate is unstable in the region of 2192 degrees Fahr. but this gives no trouble in service as any free lime and dicalcium silicate formed are not subjected to hydration and the temperature will not be below 1247 degrees Fahr. the maximum temperature at which the beta-gamma transformation of dicalcium silicate occurs. It is this reaction which causes the falling phenomenon well known to arc-furnace steelmakers who speak of "a white falling slag"; if this occurred in the brick, there would be a similar shattering effect.

Semistable dolomite bricks are made by mixing the ordinary burnt dolomite with a small quantity of flux. This melts during firing and coats the grains with a thin film which prevents hydration for a short time. A temporary bond such as tar is used before firing. Apart from the fact that these cannot be stored for long, these bricks are superior to stabilized dolomite in every way, especially in their spalling resistance and comparative freedom from attack by high iron oxide slags.

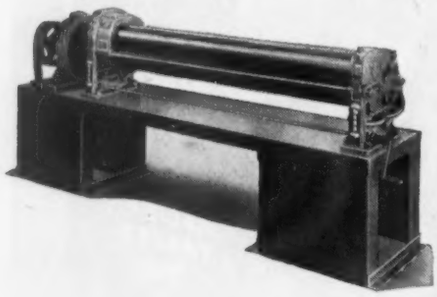
(*Continued in next week's issue*)

INDUSTRIAL EQUIPMENT

Plate Bending Roll

Webb Corp., Webb City, Mo., offers a new plate bending roll. Designated as model 2-L it is a bench type machine, but can be equipped with legs or stands. It is available in lengths from 38 to 98 inches and in capacities from 7 to 16 gage and thinner.

The roll features a totally enclosed

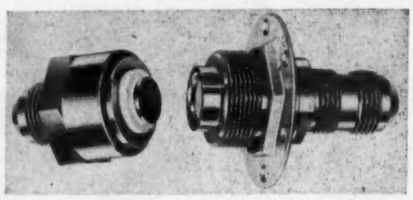


speed reduction unit. The top shaft is raised and lowered for removal of cylinder by means of hand crank at tail end of the machine. The unit is driven by a 3 horsepower motor through a short V-belt drive.

Self-Sealing Coupling

Improved self-sealing coupling allowing disconnection and reconnection of hydraulic or other lines without loss of fluid or inclusion of air is announced by Aeroquip Corp., Jackson, Mich. Seal is affected by an O-ring embedded in the recess of the body. One half can be provided with a detachable mounting flange.

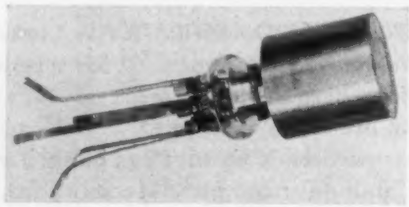
On connecting the coupling halves, the protruding portion of the left half makes contact with the sleeve of the other body. Simultaneously all air is expelled between the mating parts of the halves, preventing it from entering the system. Further movement of the union nut will move the



valves until position is reached allowing free passage of fluid.

Power Tube

Designed for industrial use in high-frequency heating equipment, a new compact power tube has been developed by Federal Telephone & Radio Corp., Newark, N. J. Designed as F-5303, this tube is supplied with 6-inch flexible copper leads permanently secured to the tube terminals. There is an absence of ceramic insulation, both internal and

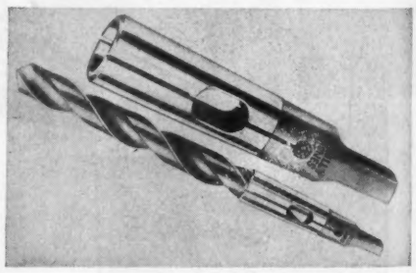


external. An oversize filament insures abundant emission throughout the life of the tube. Extra-heavy anode wall provides large thermal capacity for added protection against momentary overloads.

Rated at 3500 watts input, this tube operates at full ratings at frequencies up to 50 megacycles. Maximum ratings are: direct current plate voltage 3500 volts, direct current plate current 1.0 ampere, plate dissipation 1200 watts. The filament current is 27.5 amperes at 11 volts. Overall height of the tube is approximately 7 inches with a maximum diameter of 3½ inches. This model is designed for forced air-cooling, but can be supplied for water cooling installations when desired.

Drill Chuck

Scully-Jones & Co., 1901 South Rockwell street, Chicago 8, announces a new type drill chuck. This new tool is designed for holding the "shankless" high speed drills produced by Republic Drill



& Tool Co., Chicago. Seven sizes of drill chucks, ranging from No. 1 to No. 5 Morse taper are required for driving the 1235 different sizes of shankless drills, ranging from 1/3 to 2 inches in diameter. There are seven additional sizes of chucks provided to convert this same range of drills to an "oversize" shank series, eliminating the necessity of sleev-

(All claims are those of the manufacturer of the equipment being described.)

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"	11, All Position, A. C.	AWS E-6011
"	8, General Purpose, Poor Fit-up	AWS E-6012
"	13, General Purpose, Light Gauge	AWS E-6013
"	20, Horizontal Fillets	AWS E-6020
"	5, Deep Grooves	AWS E-6030

HIGH TENSILE STEEL ELECTRODES

Type—RACO	74, All Position, Reversed Polarity	AWS E-7010
"	64, Horizontal Fillets	AWS E-7020

STAINLESS STEEL ELECTRODES

Type—RACOLLOY	18-8, Unstabilized	Type 308
"	18-8Cb, Stabilized	Type 347
"	18-8(1.5% Mo)	Type 316
"	18-12(2-3% Mo)	Type 317
"	18-12(3-4% Mo)	Type 307
"	19-9, For Welding air-hardening steels	Type 309
"	25-12, Unstabilized	Type 310
"	25-12Cb, Stabilized	
"	25-20, Scale-resisting steel	

HARD SURFACING ELECTRODES

Type—RACO 25, 20-25 C Rockwell (Machinable Deposits)
" 45, 40-50 C Rockwell
" 55, 50-60 C Rockwell
RACOLLOY Manganese, Austenitic Manganese Steel

LIGHTLY COATED ELECTRODES

Type—Blue Label, Sull Coated, Manual Welding		AWS E-4510
Type "D" Automatic or Manual Welding		AWS E-4520
Type "D" .30-.40 C, For surfacing		AWS E-4520
Type "M" Automatic Welding		

OXY-ACETYLENE WELDING RODS

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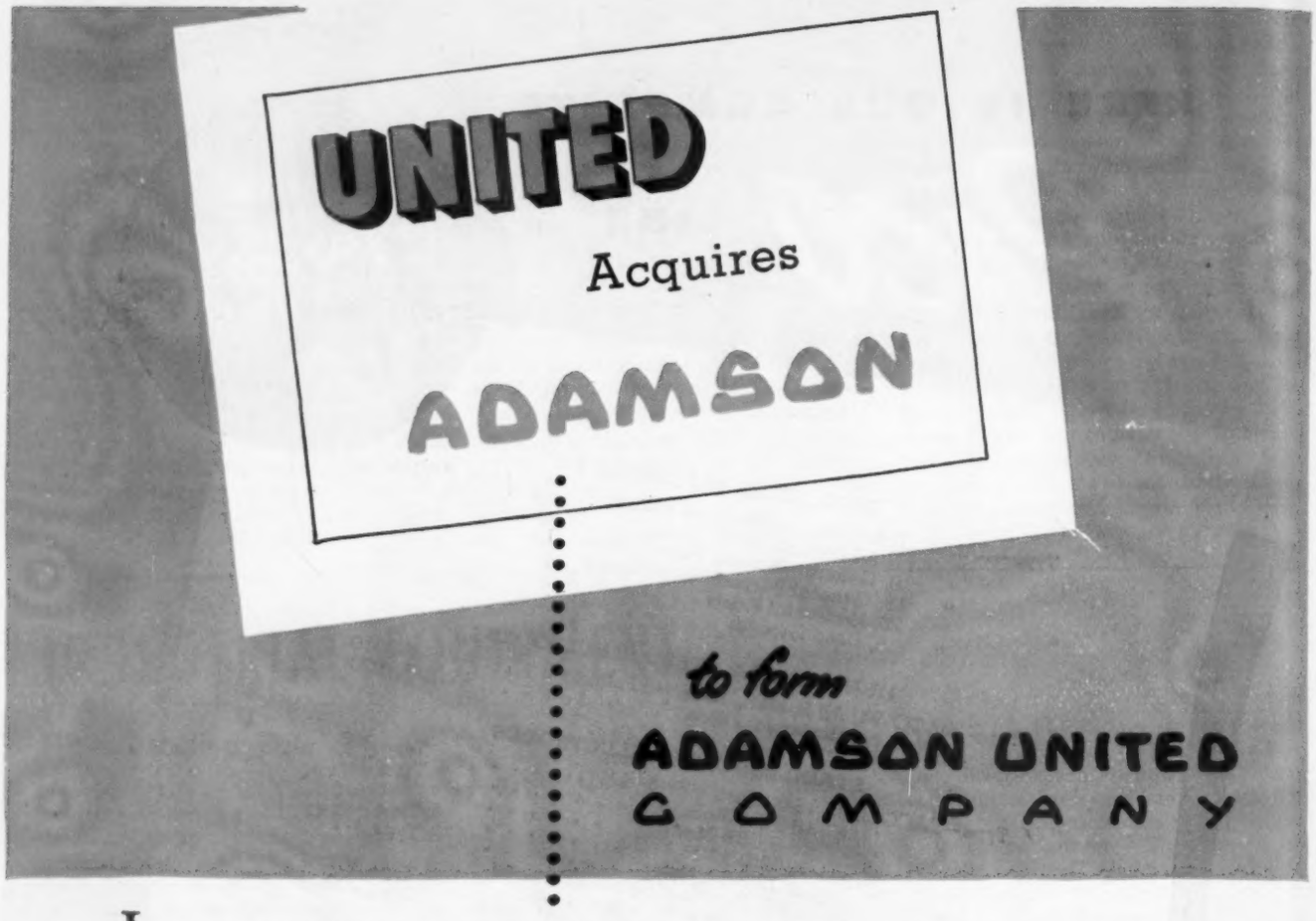

IN line with their policy of greater service to the rolling industry, UNITED ENGINEERING AND FOUNDRY COMPANY of Pittsburgh, Pennsylvania, have acquired the ADAMSON MACHINE COMPANY, located at 730 Carroll Street, Akron, Ohio.

Long and internationally known as one of the largest designers and builders of basic machinery for the Rubber, Plastics and Plywood Industries, this old established manufacturer will be known hereafter as ADAMSON UNITED COMPANY, a corporation chartered under the laws of the State of Ohio.

The new company, a wholly-owned subsidiary, will not only continue to engineer and build machinery for the manufacture of Rubber, Plastics and Plywood, but because of the additional facilities available, will have greater capacity for servicing existing equipment and a more comprehensive engineering service to offer the industry in the development of new processes and machinery.

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Calenders	Washers	Pot Heaters	Multi-Platen Presses
Mills	Driers	Ram Type Vulcanizers	Automatic Curing Presses
Mixers	Tubing Machines	Autoclaves	Belt Curing Presses
Refiners	Large Molds	Hydraulic Presses	Auxiliary Equipment

UNITED ENGINEERING AND FOUNDRY COMPANY
Pittsburgh, Pennsylvania

Plants at Pittsburgh, Vandergrift, New Castle, Youngstown, Canton

Davy and United Engineering Company, Ltd., Sheffield, England
Dominion Engineering Works, Ltd., Montreal, P. Q. Canada
Adamson United Company, Akron, Ohio

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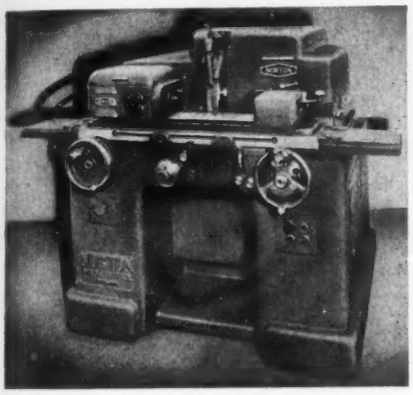
ing up when larger taper shanks are required.

This chuck is a collet-action driver, designed for driving shankless drills in any machine having a spindle, holder or attachment with a Morse taper hole. It is furnished with a Morse taper on the outside and has a straight hole the same diameter and length as the neck of the shankless drill. At the bottom of the hole is a splined section, in the form of an elongated slot, with two opposite driving flats. This slot has an opening that permits the tang of the shankless drill to enter and engage the driving flats, thereby assuring positive drive. To assure accuracy and concentricity, all chucks for shankless drills are precision ground, internally and externally.

Cylindrical Grinder

Designed for short length, small diameter work, Norton Co., Worcester, Mass., announces a new 4-inch type C cylindrical grinder. Hydraulic table traverse, automatic infeed of the wheel at each table, reversal and adjustable dwell at each end of the table traverse are



standard arrangements. The machine is available as plain or semi-automatic with manual or automatic cycles. When a semi-automatic machine is desired, continuous wheel feed can be furnished. Work speeds are from 100 to 1000 revolutions per minute. Grinding wheels 16 inches in diameter and up to 3 inches wide are available for this machine. Other features include a wheel spindle with automatic lubrication and automatic coolant controls.

Heat Treating Furnace

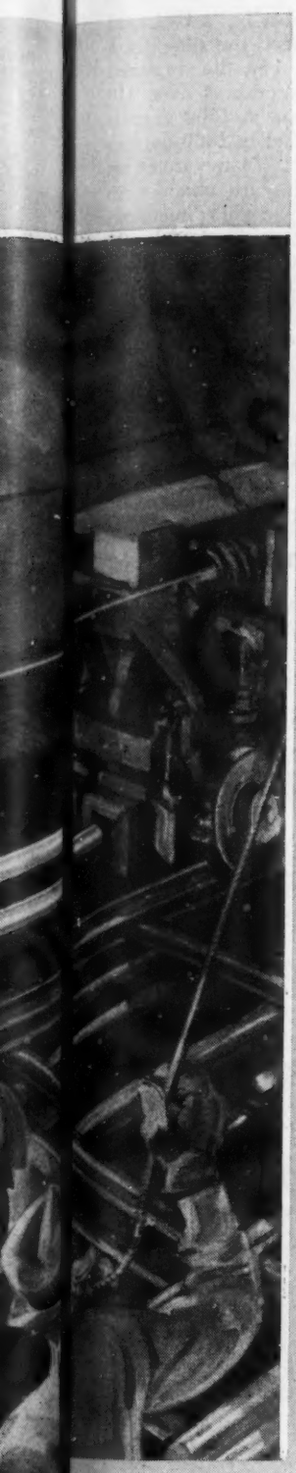
Providing three heating areas in one installation, Barkling Fuel Engineering Co., 400 North Paulina street, Chicago 22, announces a pedestal type, multipurpose heat treating furnace. It has an indirect heating chamber for hardening, annealing, stress relieving and carburizing, with door opening 4½ x 8 inches; a direct heat chamber for heating for tool dressing, forging, bending, with opposed openings in front and back 2 x 4½ inches, and a tempering surface on top for tempering tools and dies. The

Announcing
THE NEW COATED ABRASIVE BOND
THREE-M FLINT PAPER
THREE-M-ITE CLOTH
GRIT-LOK
BOND
an improved method of anchoring the abrasive mineral to the backing, giving
BETTER QUALITY and RESULTS
● In line with our policy of supplying users with the best surface coated abrasives that can be produced, we are now making a wide range of 3-M Coated Abrasives available with GRIT-LOK, the new long-wearing bond. Countless tests on actual production work show this new improved method of construction gives these important advantages:
★ EXTRA TOUGHNESS
★ LESS HEATING
★ LESS FILLING
★ MORE MILEAGE
★ BETTER FINISHING
● 3-M Coated Abrasives made with GRIT-LOK Bond are new in appearance and better in performance. On every kind of surface and every grinding operation, they help to increase production and lower production costs. If a check of your stockroom or tool crib shows that you haven't already tried them, order a supply from your 3-M Products distributor today.
MFRS. 3-M PRODUCTS
MINNESOTA MINING AND MANUFACTURING CO.
GENERAL OFFICES SAINT PAUL 6 MINN
BRANCHES IN PRINCIPAL CITIES

Making sure LST shaft is true

Cold drawing steel bars

FROM AN ORIGINAL DRAWING AND SKETCHES MADE AT J&L PITTSBURGH WORKS BY ORISON MACPHERSON



...aring rods for
cold finishing

BETTER STEELS FOR WAR BY COLD FINISHING

Cold finished steels are greatly aiding the war effort. Enormous tonnages of these better, stronger steels go into fighting equipment. The machine tools that produce this fighting equipment are themselves largely made of steel that has been worked cold.

Cold working is an art at J&L, for it was here cold rolling was invented. Long accumulated skills and experience, aided by research, help J&L to solve quickly many an urgent problem of Army supply and Navy procurement.

War has greatly accelerated and expanded the applications of cold finished steel. This will bring about greater peacetime uses of this versatile steel — for better living.

JONES & LAUGHLIN STEEL CORPORATION

PITTSBURGH, PENNSYLVANIA

J&L STEEL

CONTROLLED QUALITY STEEL FOR WAR AND PEACE

COPYRIGHT 1945—JONES & LAUGHLIN STEEL CORPORATION

COLD FINISHED

Pulling cold steel bars through diamond-cut dies to within ten-thousandths of an inch of desired size (see illustration) gives them hard, shining surfaces, makes them extremely accurate in size and straightness, and increases their strength and resistance to fatigue. Large and small steel bars are cold finished by turning, grinding, polishing, drawing, cold rolling.

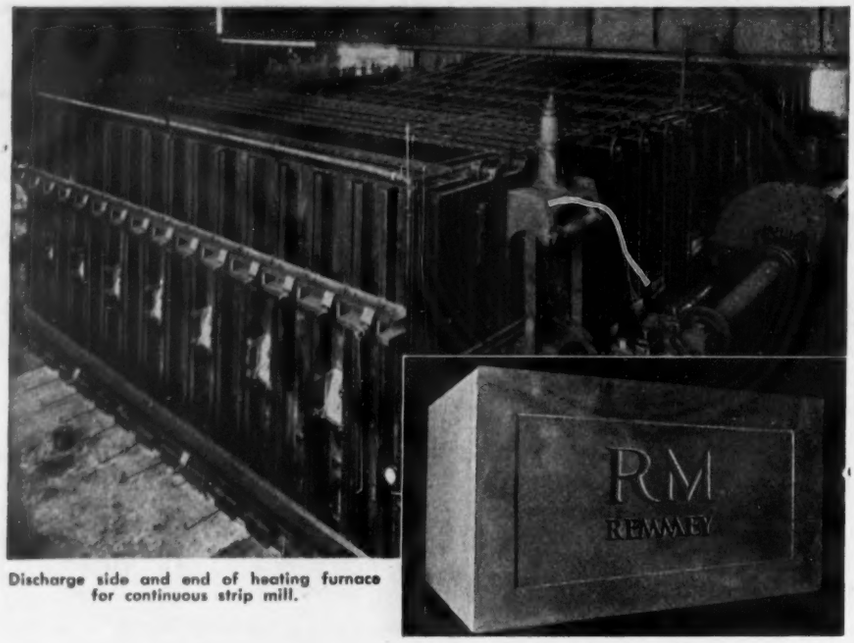
Cold finished steel aids war, being used in practically every piece of Army, Navy, Marine and Merchant Marine equipment. Tiny, cold finished rods, smaller than the leads in automatic pencils, are being furnished by Jones & Laughlin Steel Corporation to be made into parts for watch-like fuses in aerial bombs.

Propeller shafts for LST's, huge steel rounds 7½ inches in diameter and 20 feet long, several of which are used in each of the famous landing barges, are being produced in J&L cold finishing mills. Smaller sizes are used in speedy PT boats. Other cold finished steel is used in enormous quantities for shells and parts for planes, tanks, jeeps, trucks, guns, rockets, range-finders, motors, ships, landing craft and other military equipment.

Cold working of metal is an ancient art. References to it are found in the Bible. Cold drawing of metals (wrought iron, copper, brass, bronze) is known to have been practised in Europe in the 13th century. First authentic record appears in the reign of Queen Elizabeth, who, in 1564, brought skilled Saxon metalworkers into England to work at this art. Cold finishing of iron or steel bars did not develop until the advent of steel (in the 1860's) laid the foundation for today's great cold finished steel industry and rapid development of modern machine tools.

J&L invented cold rolling in 1860 when Bernard Lauth, partner of B. F. Jones, founder of Jones & Laughlin Steel Corporation, experimented successfully with passing cold iron and steel bars through a series of rolls, effecting a slight reduction in each pass. The process, patented, was a J&L specialty for many years.

The machine tool, the machine that makes machinery, was invented by young British mechanic, Joseph Whitworth (born December 21, 1803) to improve weaving and cotton spinning industries. Previous to Whitworth's many inventions, machinery for manufacturing was crudely made up by hand with chisels, hammers, files, primitive lathes and simple screw cutting machines which did not even cut standard threads. Sir Joseph Whitworth's inventions (he was knighted for them) and the subsequent invention of cold finishing of steel brought about a great industrial revolution, now known as the Machine Age.



Discharge side and end of heating furnace for continuous strip mill.

SEMISILICA BRICK

A vital need for many furnaces is a refractory which will withstand "Maintained Heats" at 2200° F to 2700° F. In this heat range fire clay bricks usually vitrify and spall—Silica bricks resist the heat but are not adapted to withstand frequent furnace cooling.

RM Brand Semisilica Bricks are made for this job—to resist "Maintained Heats" between 2200° F and 2700° F and to withstand frequent furnace cooling.

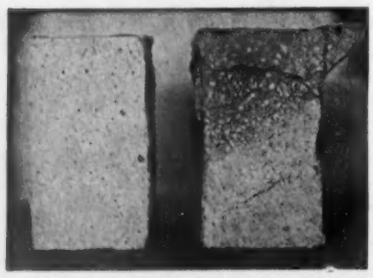
Use them in furnaces where temperatures are maintained at high levels for long periods and where fire clay bricks may shrink, deform, vitrify and spall and where temperature change and furnace shutdown prevent satisfactory performance of silica brick.

In STEEL MILLS:

For Heating, Reheating, Annealing and Heat Treating Furnaces, OH Regenerators, Blast Furnace Stoves, Soaking Pits, etc. In the roofs, where spalling failure is most prevalent, they perform their greatest service.

In MANY INDUSTRIES:

Such as Chemical, Ceramic, Zinc Smelting and other industries where continuous heats in the temperature range of RM's are required for their processes.



Crosscut of fire brick showing the spalling of one brick due to vitrification and the absence of spalling in the RM brick which did not vitrify.

RICHARD C. REMMEY SON CO.
HEDLEY STREET & DELAWARE RIVER
Philadelphia, Pa.

REMMEY

indirect heating chamber has a U-shaped hearth 6 inches between the ribs and 8 inches deep which can be replaced through the door. Interior is over 410 cubic inches and heats to 1500 degrees Fahr. in 10 minutes and to 1900 degrees Fahr. in 29½ minutes. Temperatures up to 2500 degrees Fahr. are obtained in direct heat chamber. Overall dimensions of the furnace are 25 inches wide, 19 inches deep and 53 inches high.

Maintaining constant heats is made possible by an air relief valve operating in conjunction with a blower which eliminates variations in pressure. Other features include counterbalanced door, gas-air ratio mixing valves and capped connection for attaching pot type furnace employing the single blower for both units.

Cleaning Machine

The new ball bearing cleaning machine offered by L & R Mfg. Co., 577 Elm street, Arlington, N. J., combines the rotary principle with a new pressure cleaning mechanism. In the basket of the rotary cleaner, from 50 to 100 bearings of various sizes may be precleaned. In the pressure cleaning tank, continuously

filtered solution under 6 to 10 pounds of pressure is forced through each bearing individually. Filtered compressed air is provided to remove surplus solvent from the bearing while it is still on the pressure cleaning spindle.

The bearing on the pressure cleaning spindle is rotated alternately clockwise and counter-clockwise to obtain maximum surface coverage by the solvent. The coned head into which the bearing fits to receive the cleaning compound is made to accommodate eleven sizes of bearings. The tank in which the pressure cleaning mechanism is located is sealed during its operation. The process may be observed through the glass lid with

IT'S YOUR POSTWAR ELECTRICAL HOME

—See that it works!

THINK of your electrified home to come . . . big and little appliances of all kinds . . . advanced heating . . . air-conditioning . . . better lighting . . . television . . . All fine servants—but they will be handicapped if you give them insufficient electrical capacity.

So often electrical wiring plans are based on *past* electrical experience—a poor guide to the needs of peak loads to come. It's far safer to plan *reserve* capacity in line with the huge future increase in electrical usage. You'll save yourself plenty of grief later in breakdowns and expensive alterations.

Manufacturers! Apply this in terms of industrial equipment in *your* business. The problem's the same. Make sure you have ample electrical capacity to meet the huge future increases in electrical usage sure to come. In plants too, planned wiring will cost a lot less than unplanned wiring.

Before structures get out of the planning stage, it will pay to consult electrical contractor, utility power engineer, plant power engineer. They'll agree that it's always wiser to *Wire Ahead!* 44585

ANACONDA WIRE & CABLE COMPANY

25 Broadway, New York 4 . . . Sales Offices in Principal Cities

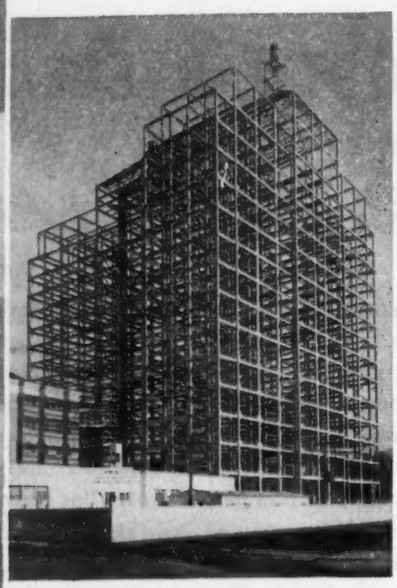
ANACONDA

It's Always Wiser to TELEGRAM WIRE TELEGRAM AHEAD

Confidence Counts

when you buy Fabricated Steel

Ingalls prides itself on its ability to produce fabricated steel efficiently and economically, to meet rigid specifications and to deliver on time. Through the years the company has gained an enviable reputation for dependability — a definite asset to its customers. For instance, one large company no longer asks for bids. Knowing from experience that the cost will be reasonable and the job done right, the company calls on Ingalls for all its fabricated steel needs. Look to Ingalls now and after the war for the latest developments and economies in utilizing welding for the fabrication of structural steel and plate work.



INGALLS
STEEL

THE INGALLS IRON WORKS COMPANY, THE INGALLS SHIPBUILDING CORPORATION, The Steel Construction Company, Birmingham Tank Company. Offices at BIRMINGHAM, New York, Washington, Pittsburgh, New Orleans. Fabricating plants at Birmingham and Pittsburgh. Shipyards at Pascagoula, Mississippi, and Decatur, Alabama.

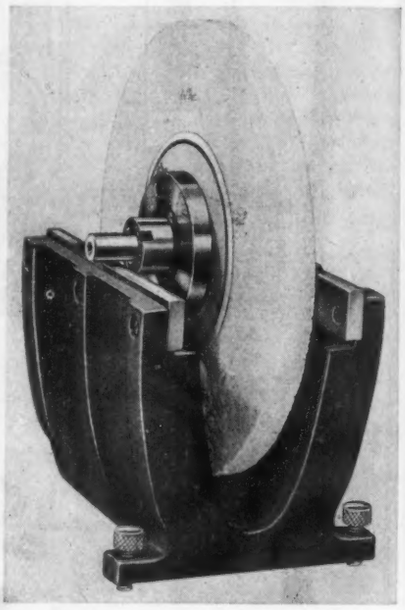
visibility aided by a plastic hooded lamp located within the tank opposite the spindle.

With minor changes the machine can be adjusted to clean gears and other small assemblies with or without ball bearings.

The basket of the rotary cleaning unit measures 5½ inches inside diameter by 3⅜ inches deep. Total weight of the machine is under 200 pounds. Current is 110 volts, alternating current. All controls are mounted on a panel located at the front of the machine.

Balancing Stand

A new balancing stand for surface grinding wheels is offered by Taft-Peirce Mfg. Co., Woonsocket, R. I. The device consists of a cast iron base on which two



hardened rails are mounted. The balancing arbor rolls freely on these rails to indicate balance of the mounted wheel. It will accommodate surface grinding wheels up to 7 inches in diameter.

Honing Machine

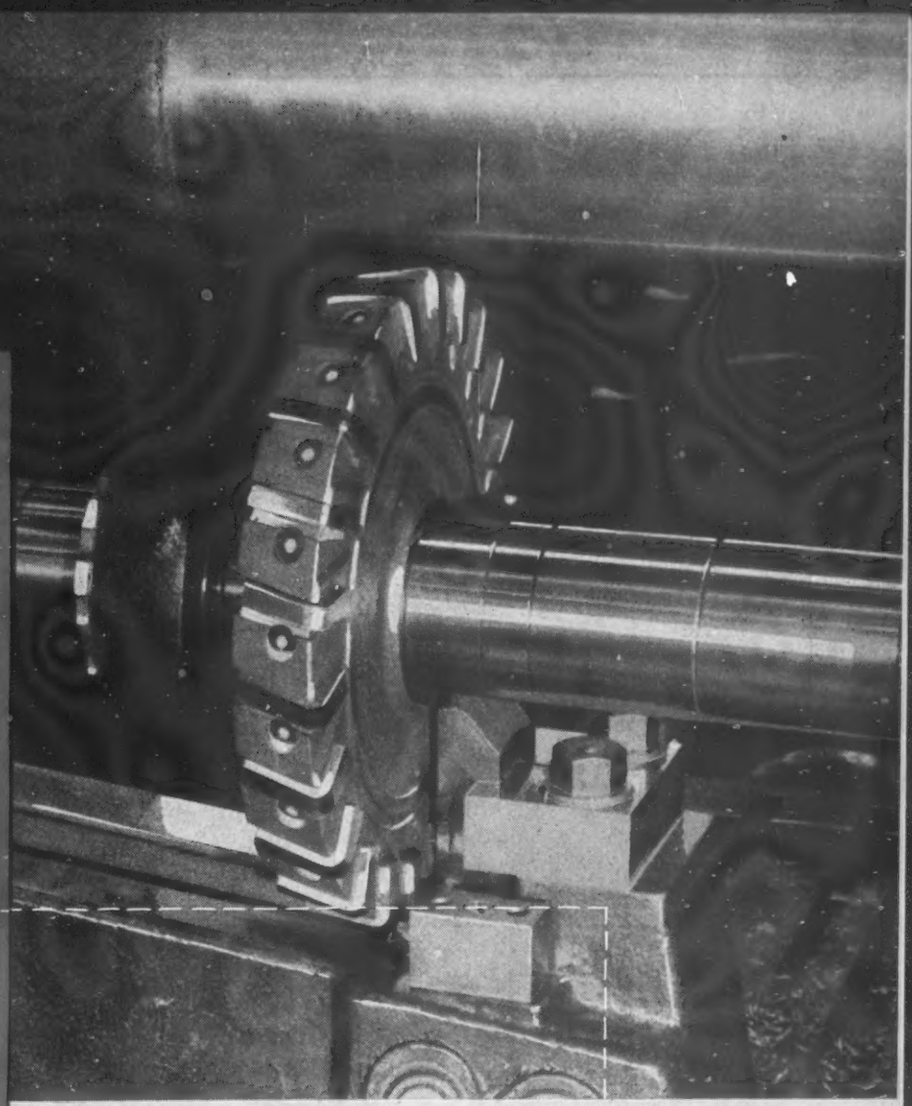
C. Allen Fulmer Co., 1217 First National Bank building, Cincinnati, offers a new machine for honing or lapping of aircraft engine cylinders to a high degree of accuracy and finish. It produces straight, round, smooth bores to working tolerances as small as 0.0002-inch. It has a wide range of spindle and reciprocating speeds. This unit is particularly adaptable for finishing aircraft cylinders, connecting rods, all types of internal combustion cylinders, supercharger parts, landing gear struts, recoil cylinders and others where superfine cylinder surfaces and extreme accuracy are required.

The unit can be supplied with various working stroke lengths up to 72 inches and with cylinder honing capacities up to 20-inches in inside diameters. All the controls are located at the front of the

WHEREVER METAL IS MILLED THEY SAY—

"PUT IT ON A *Milwaukee*"

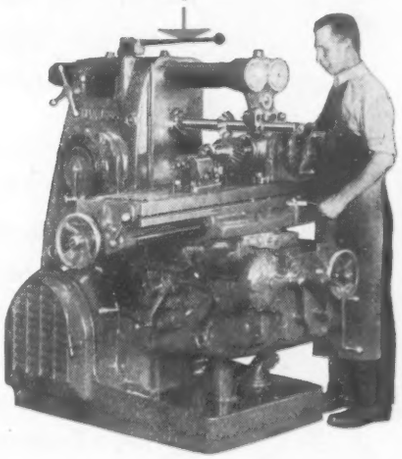
For SPEED PRECISION PROFIT



A special inserted blade side-milling cutter, mounted on a Milwaukee Style B Arbor, is milling this workpiece held in a special fixture clamped to the table of a Milwaukee 3K Milling Machine.

Yes — wherever metal is milled in the tool-room or experimental laboratory, on the production line — Milwaukees rank "tops" as the performers — the machines that get the work done with speed — precision — and profit. In fact when the job is a bit difficult or involved experienced machine-shop men usually say: "Put it on a Milwaukee"!

The next time you need milling equipment consult with a Kearney & Trecker field engineer. He will explain why you can effect sustained precision performance through the years with Milwaukee — the powerated milling machines — engineered and built in keeping with their rated motor hp.



Standard models — horizontal, vertical and bed types — in motor ranges 3 to 25 hp; C.S.M. (Carbide Steel Milling) machines 20 to 50 hp; special machines in a wide range of sizes, types, motor hp. *Write for complete information.*

KEARNEY & TRECKER
CORPORATION
MILWAUKEE 14, WISCONSIN

Milwaukee Machine Tools

IN PRECISION INSTRUMENTS IT'S DIE-CASTING, TOO

Partial View of Foxboro Temperature Controller Assembly Line

Eloquent testimony to the accuracy with which intricate and minute metal parts may be die-cast is found in the manufacture of Foxboro Temperature Controllers.

As a time factor, too, The Foxboro Company have discovered the advantage of die-casting, not only in the greater volume of parts produced per hour but in the release of labor for machining operations formerly necessary.

Finally, as an example of Advance Pressure's slogan "Quality with Economy", Foxboro reports that the switch to die-casting saved them enough man-hours the first year to pay for the intricate dies.

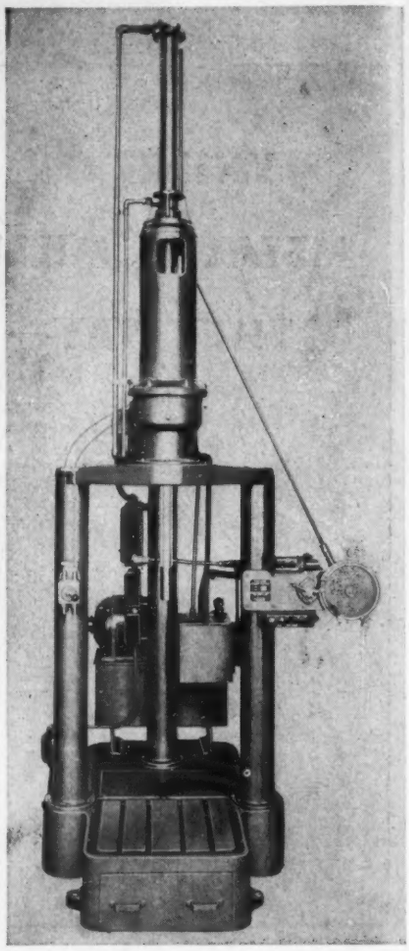
Your inquiry, with sketch or blue print, involves no obligation

ADVANCE PRESSURE CASTINGS, INC.

Engineers, Designers and Manufacturers of Die-Castings of "Quality with Economy"

42 North 15th St. **Brooklyn 22, N. Y.**

machine within reach of the operator. Stroke setting, hone withdrawal, short-stroking, changes in spindle or reciprocating speeds can be handled from the floor or operator's station. Spindle and shafts are properly heat treated and



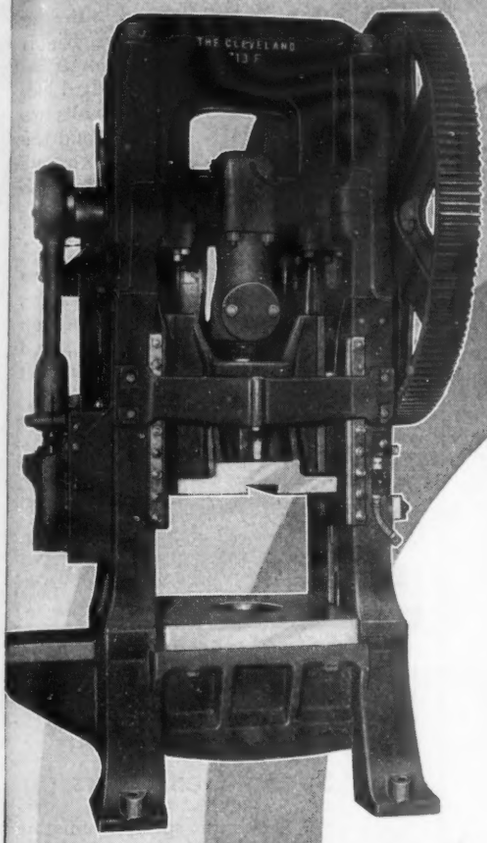
mounted on oversize roller or ball bearings, all operating in a bath of oil. In the base of the machine a supply of coolant is carried which passes through multiple settling chambers before being repumped to the work.

Pressure Unit

Designated as Bar-Lok, Mechanics Engineering Co., Jackson, Mich., offers a pressure unit designed for installation in jigs and fixtures or in any application where quick clamping and unclamping in repetitive operations can improve the efficiency of machining, welding, assembly or positioning.

The unit consists of a radially grooved pressure bar inserted through a threaded pressure collar and provided with a handle and foot. The whole unit is placed in the fixture through a threaded hole in the wall or riser. The clamping pressure is applied by advancing the pressure bar to contact with the work and turning the handle only a slight turn to the right.

This device is available in two series, one for heavy duty and one for medium duty. The pressure bar of the heavy duty



CLEVELAND
SINGLE CRANK PRESSES

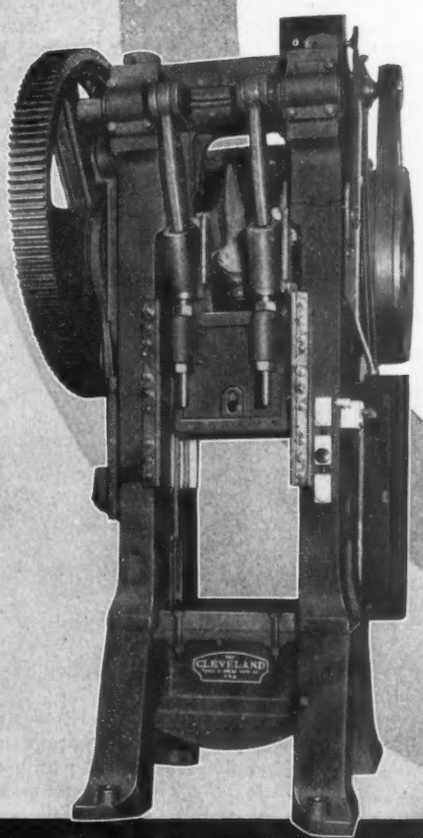
Equipped with

ELECTRICALLY CONTROLLED FRICTION CLUTCHES

These three illustrations show some of the smaller sizes of Cleveland Trimming, Double Action Toggle and Straight Sided Presses equipped with electrically controlled friction clutches and brakes, which can be used for inching, long and short stroke or continuous operation of the slide.

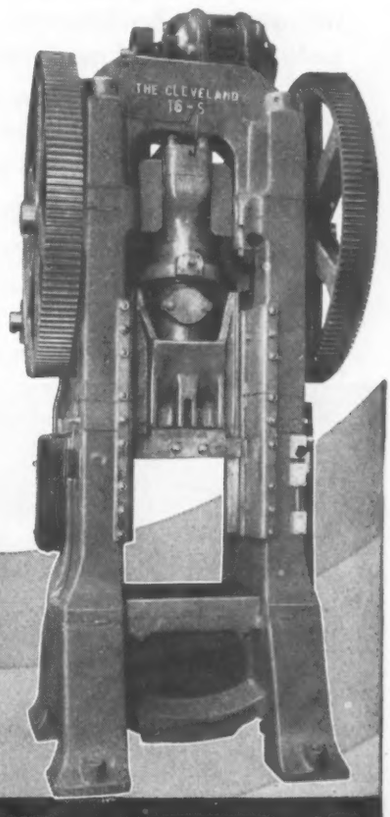
As will be noted, this design contributes to a more compact machine, without overhanging brackets, saves valuable overall floor space and assures greater ruggedness and accuracy.

The Presses illustrated can be furnished in sizes and capacities to suit requirements and with manually operated jaw clutches or electrically controlled pneumatic or hydraulic friction clutches.



Other Types of Cleveland Presses Include

- Inclinable
- Horning
- Punch Type
- Open Back Gap
- Knuckle Joint
- Straight Sided Double Crank
- Double Crank, Double Action Toggle
- Single Point Two Point and Four Point



THE CLEVELAND PUNCH & SHEAR WORKS CO.

CLEVELAND, OHIO

HOW WORK SPOILAGE CAN BE REDUCED BY INSTALLING KORFUND VIBRATION CONTROL

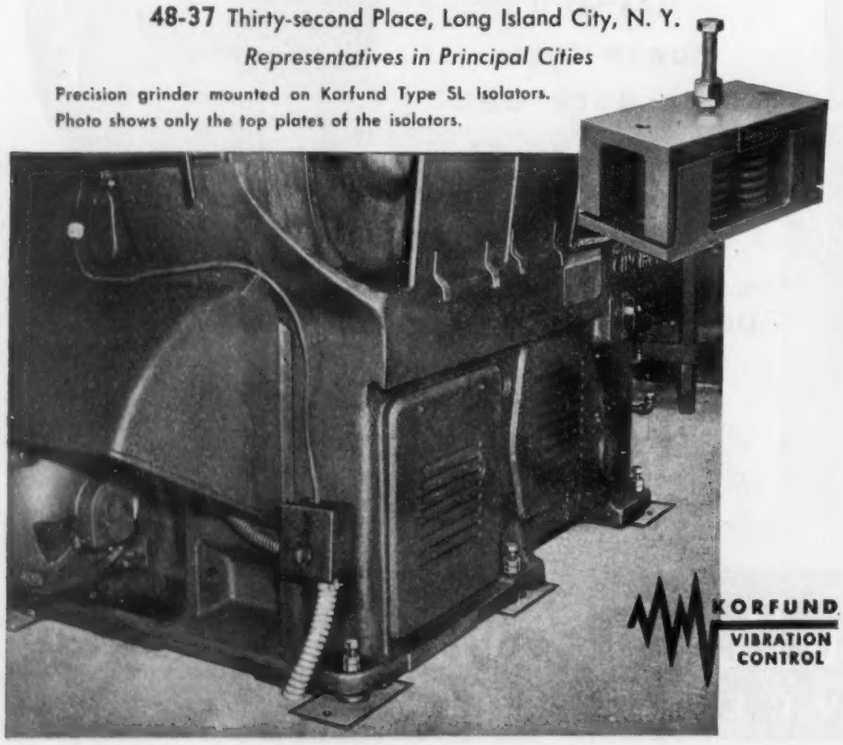
The inability of machine tools, such as grinders, jig borers, and lathes to hold to close tolerances is due in many cases to vibration from external sources. Vibration of a fraction of a thousandth of an inch in either the chuck or the cutting-tool can spoil a machine's precision and turn the work into scrap.

In one prominent war plant, vibration caused by factory trucks passing a battery of machine tools destroyed the fine accuracy of the work. In another plant, work spoilage on a thread grinder was caused by vibration from a punch press located in a different part of the building. In both cases, Korfund steel spring Vibro-Isolators restored precision.

If your machine tools are not holding to precision tolerances, it may not be the fault of the machine. Call a Korfund engineer . . . no obligation.

THE KORFUND COMPANY, INC.
48-37 Thirty-second Place, Long Island City, N. Y.
Representatives in Principal Cities

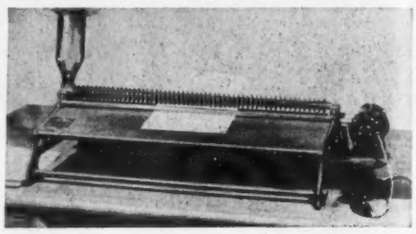
Precision grinder mounted on Korfund Type SL Isolators. Photo shows only the top plates of the isolators.



unit is ⅝-inch square and the pressure collar is 1⅛-inch in diameter, carrying the standard No. 7 N.C. thread. In the medium duty unit the pressure bar is ½-inch square and pressure collor is ⅞-inch in diameter, carrying a standard No. 9 N.C. thread. The bars in both units are machined from square bar stock and the collar is turned from high tensile bronze.

Developer

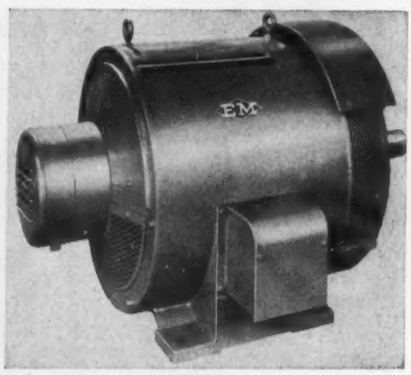
With model 153-M BW continuous developer, designed by Charles Bruning Co., Chicago, cut sheets or roll stock up to 24 inches may be developed at a speed of 12 feet per minute. It is a compact



unit and requires little space. No experience is necessary to develop black and white prints with this machine.

High Speed Generators

A new line of high speed alternating current generators is announced by Electric Machinery Mfg. Co., Minneapolis, Minn. Built in sizes 18.7 to 125 kilovolt-amperes, 1800 to 514 revolutions per minute, for standard voltages, 1, 2, or 3 phase, 50 and 60 cycles, 80 per cent power factor, 50 or 40 degrees Cent. rise, generators are supplied as two bearing units for belted or coupled duty, or single bearing for direct coupling to



driving engine. Drip-proof generator construction is standard.

The generators are also available as packaged units, with controls mounted on generator frame and wiring factory-connected. Packaged generators are compact and suitable for portable or stationary service. These controls consist of a NEMA class 1 metal enclose, housing the Synchrostat voltage regulator and meters. No switchgear is required; and three wires run to the load through the generator switch. Responsive action of the voltage regulator minimizes voltage

HAVE YOU A PRODUCT ON THIS LIST?

SHELL CONTAINERS
ROCKETS
PORTABLE PIPE LINES
FRAGMENTATION BOMBS
POWDER CONTAINERS
TANK TREADS
GRENADE ADAPTERS
SHELL BURSTERS
FUSE COVERS

★

AUTOMOTIVE PARTS
METAL FURNITURE
BICYCLE PARTS
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REFRIGERATOR PARTS
WASHING MACHINE PARTS
ROLLER CONVEYORS
BUSINESS MACHINE STANDS
LAWN MOWER PARTS

If you make any product—war or peace—that calls for steel tubing, it will pay you to investigate the advantages of "STANDARD" ELECTRIC WELDED STEEL TUBING. We have complete facilities for the manufacture of this superior type of ELECTRIC WELDED STEEL TUBING in all regular and many special sizes. And these facilities are backed by many years experience. We'll be glad to help you with your tubing problems. For full information, contact our representative in your area, or write us direct.

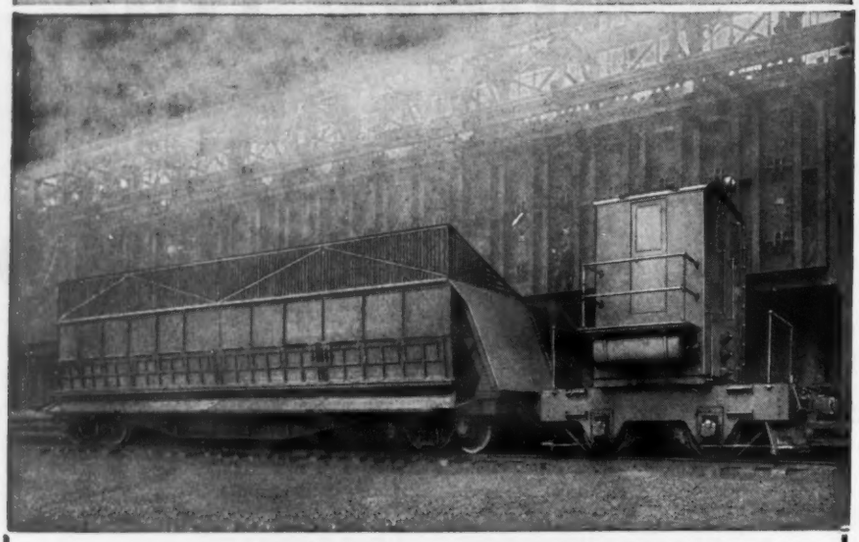
★ *Complete Tube Stocks Maintained by* ★
STANDARD TUBE SALES CORP., One Admiral Ave., Maspeth, L. I., N.Y.
LAPHAM-HICKEY COMPANY, 3333 W. 47th Place, Chicago 32, Ill.
UNION HARDWARE & METAL CO., 411 E. First St., Los Angeles 54, Cal.

THE STANDARD TUBE CO.

Detroit 3, Michigan

Welded Tubing *Steel Forgings*

COKE OVEN EQUIPMENT



QUENCHING CARS AND LOCOMOTIVES

All Atlas Coke Oven Equipment is of heavy-duty construction permitting the peak operating conditions required in today's stepped-up production schedules. As a result of years of experience, Atlas is able to design and build equipment, to meet the requirements of each particular coke plant. Detailed information available on request.

Other ATLAS Products

Ore Transfer Cars
•
Scale Charging Cars
•
Electrically Operated Cars for Every Haulage Purpose

Locomotives for Switching and Interplant Haulage
•
Turntables

The ATLAS CAR & MFG. CO.
ENGINEERS MANUFACTURERS
1100 IVANHOE RD. CLEVELAND, OHIO, U. S. A.

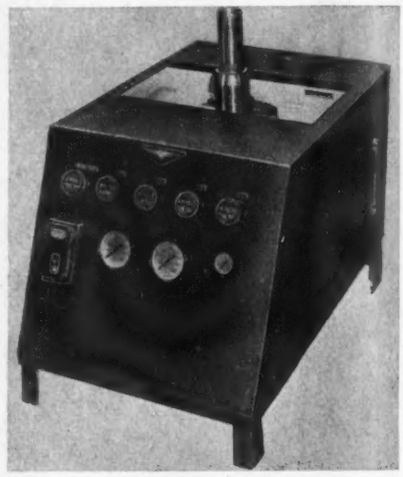
dips, automatically holds voltage at nameplate rating.

Ventilating air of generator is supplied by a ventilating system. A suction-type fan at the drive end of the generator pulls a large volume of ventilating air through both the direct-connected exciter and the generator. The intake of ventilating air is at the exciter end, opposite the driving engine on direct-coupled units, preventing circulation of heated air.

Standard direct connected exciter is of quill type, mounted on an extension of the generator shaft. Top mounted exciters, with protected V-belt drive, are provided on certain speed rating below 1200 revolutions per minute.

Test Stand

For testing all types of Hamilton standard hydromatic propellers for feathering, internal and external leakage, checking distributor valve and others, Airplane Mfg. & Supply Corp., 409 North Brand boulevard, Glendale 3, Calif., announces a new hydromatic propeller test stand. Capacity and pressure of the hydraulic



system is supplied by heavy duty 5 gallon per minute hydraulic pump driven by a 2-horsepower motor. A filter system protects pump and propeller being tested. Vacuum gage indicates restrictions or fouling of lines. Two gages give reading during tests. The operation is controlled by a set of four valves and pressure by a fifth valve. The pump motor is 2-horsepower, 1200 revolutions per minute and controlled by a contactor with thermal overload protection. Standard power for the stand is 220 volts, alternating current, 3 phase, 60 cycle. Other voltages, phases and cycles are available.

Hoist Hook

A heavy duty hoist hook that can safely handle loads up to 200 tons is offered by American Chain Ladder Co., 151 East Fiftieth street, New York. The hook keeps hoist and load in true alignment, while the patented shoulder and lip eliminates load slippage and hook straightening. If the heavy pin should shear, the weight of the load would con-

FORGINGS FOR
PARTICULAR
USERS
SINCE • 1903

QUALITY FORGINGS

Scientifically produced on these modern units under metallurgical control.

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LARGEST COMBINATION IN AMERICA

1. GIANT HAMMERS

35000 lb. hammers striking 80,000,000 lb. blows, 50 strokes per minute, are the largest hammers doing closed die forging in America. Complete range from 2000 lbs. to 35,000 lbs.

2. MASSIVE UPSETTERS

Producing inestimable pressure, forge the most intricate contours on a complete range from 4" size to the massive 9" units, the largest in America.

3. HUGE PRESSES

The most powerful forging presses providing the greatest possible utility and production. Accommodating medium and heavy work.

Consider this YOUR Forging Equipment

TODAY —PRODUCING YOUR VITAL WAR MATERIALS NEEDED TO DEFEAT THE AXIS.

TOMORROW —IT WILL BE AVAILABLE FOR YOUR PEACETIME PRODUCTION PROGRAM.

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ORIGINATORS OF UNIVERSALLY ADOPTED FORGING PRACTICES

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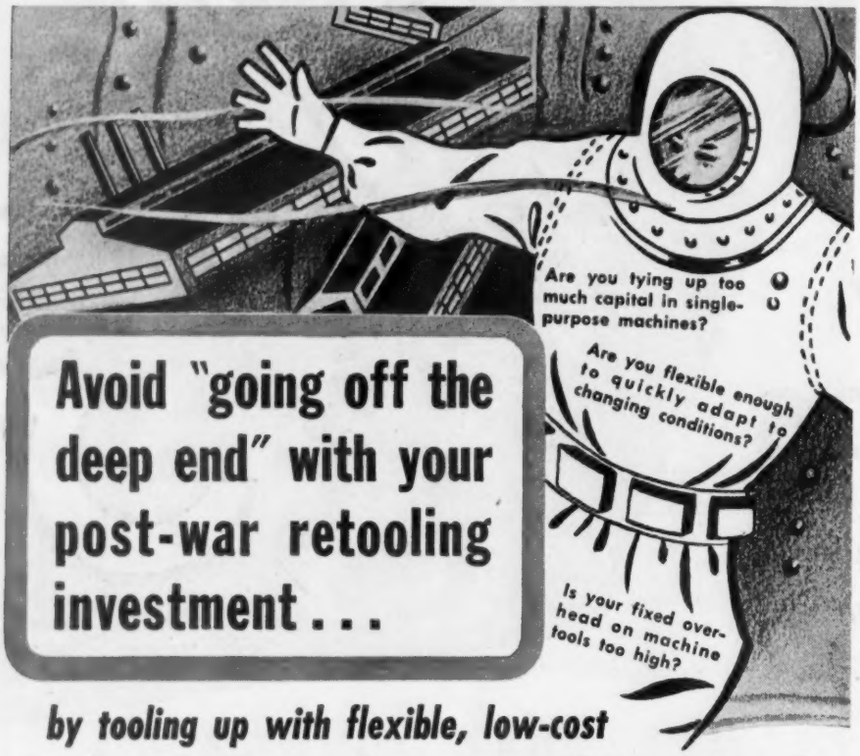
THE CANTON DROP FORGING & MFG. CO.
CANTON, OHIO

NEWARK: 1410 Raymond Comm. Bldg.—CHICAGO: 2400 W. Madison—MINNEAPOLIS: 216 Hodgson Bldg.—SEATTLE: 1600 28th Ave. W.—MILWAUKEE: 759 Milwaukee St.


Are you tying up too much capital in single-purpose machines?
Are you flexible enough to quickly adapt to changing conditions?
Is your fixed overhead on machine tools too high?

Avoid "going off the deep end" with your post-war retooling investment . . .

by tooling up with flexible, low-cost

Delta-Milwaukee Machine Tools

Delta provides a new approach to tooling — proven sound by war production — without the delay and heavy capital risk involved in buying costly, cumbersome, inflexible, special machines.

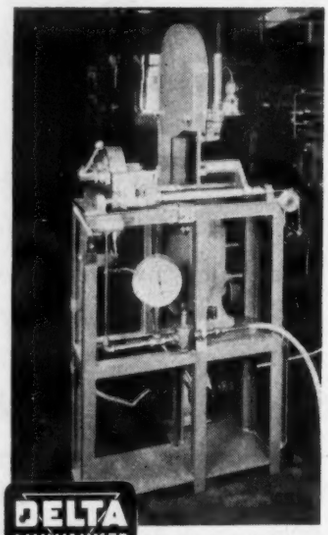
Using low-cost, stock-model Delta components, you can modernize machines in your plant that are rapidly approaching obsolescence, salvaging parts still in good condition.

You can devise high-production, special-purpose machines that can be quickly converted to other uses when conditions change.

And, because of the portability and compactness of Delta-Milwaukee Machine Tools, you can revise production line layouts, to get the best sequence of operations for increased output per man-hour, with minimum change-over time.

You cut down your fixed investment in machine tools . . . retain more liquid working capital for other post-war needs. Delta's savings in cost — and in weight and space — are not obtained at the expense of quality. They result from advanced design and from quantity production of standard models.

For a flexible, safe, satisfactory solution to the uncertain production problems that lie ahead—and for results that are creditable to all concerned — tool up with low-cost Delta-Milwaukee Machine Tools.



Typical of industry's wide use of special-purpose units built around standard, low-cost Delta machines instead of much more expensive special equipment — is this Delta 14" Metal Cutting Band Saw set-up devised for splitting large bushings approximately 6½" x 5⅛", material SAE 1020. It is not only efficient and low in cost, but doubles former production for the same operation.

Tear out coupon and mail today!

Delta's 76-page Blue Book

provides 140 case histories of valuable war production experience that may suggest similar money-saving peacetime applications in your plant. Also available is a catalog of low-cost Delta-Milwaukee Machine Tools. Request both, using coupon at right.

MA-17

THE DELTA MANUFACTURING CO.
702B E. Vienna Ave., Milwaukee 1, Wisconsin

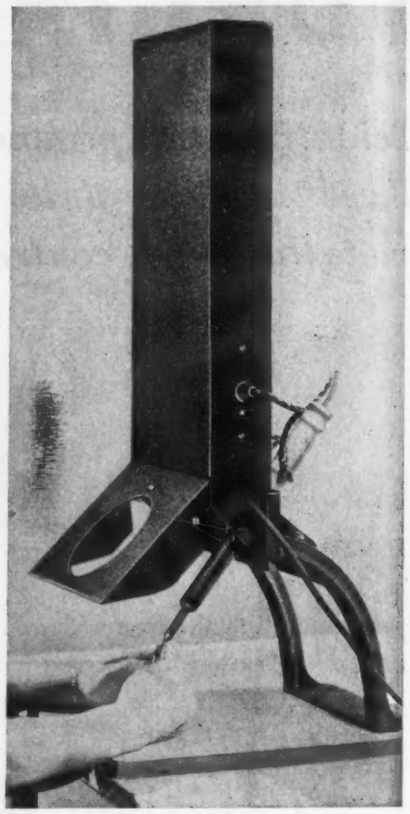
Please send my free copies of Delta's 76-page Blue Book and catalog of low-cost machine tools.

Name.....
Position.....
Company.....
Address.....
City.....(.....) State.....

tinue to hold on the safety shoulders and lips. These self-locking shoulders and lips were designed to clear hatches, cornices and other protuberances without snagging.

Soldering Stand

Model SS10 soldering stand, developed by the Ess Specialty Corp., Bergenfield, N. J., permits maximum freedom for work passing and enables the operator to focus attention on the soldered joint by means of the magnifying or plate glass window. It is supplied



with a cast bracket for mounting on assembly tables or if desired, it can be supplied mounted on a wood base. The fume stack is 32 x 9¼ x 3 inches. The shield is fitted with a plate glass window or for small work with a magnifying glass. The exterior is finished in black crackle while the underside of the hood is white.

Control for Planers

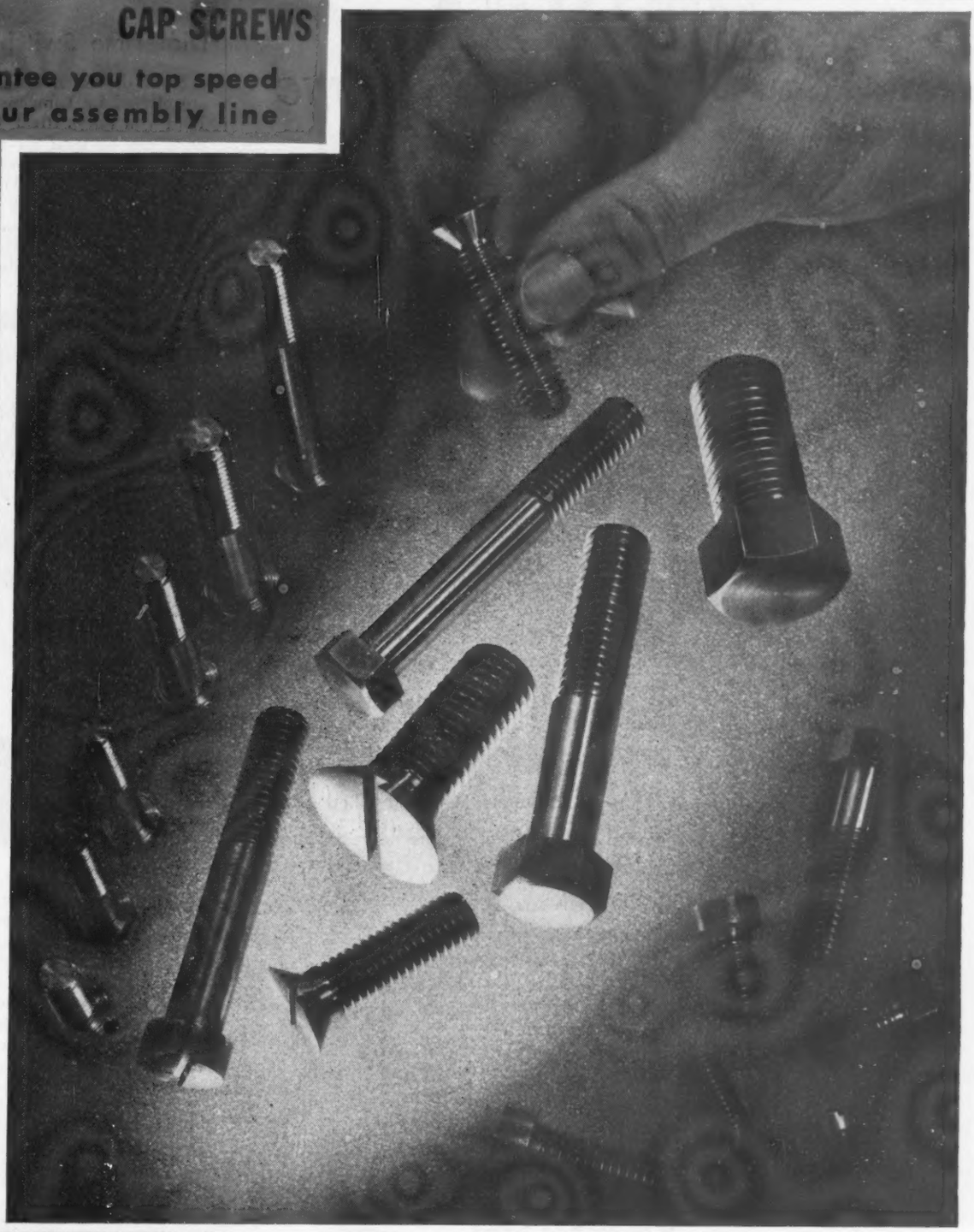
G. A. Gray Co., 3611 Woodburn avenue, Cincinnati 7, introduces a new method of pendant station control for a planer table. In operation, the planer hand identifies the hard spots and inclusions with a chalk mark and starts his machine operating with the normal cutting speed which would regularly be used on the type of work to be done if it had no hard spots. The special button marked "slow-down" is provided in the pendant station, which the operator presses as the hard spot approaches the cutting tool, causing the table to slow

LEVELAND

Top Quality

CAP SCREWS

guarantee you top speed on your assembly line



CLEVELAND *Top Quality* FASTENERS

The Cleveland Cap Screw Company

2917 EAST 79TH STREET • CLEVELAND 4, OHIO

Warehouses: Chicago, Philadelphia, New York, Los Angeles

Ask your Jobber for Cleveland Fasteners

MADE BY THE ORIGINATORS OF THE KAUFMAN PROCESS FOR GREATER STRENGTH AND ACCURACY

Founded in 1920

DETREX

LEADERS IN METAL CLEANING for 25 Years

TWENTY-FIFTH ANNIVERSARY 1945

A quarter-century of leadership in the metal-cleaning field may well be reason to "point with pride". At Detrex, however, past achievements stand only as a challenge—an incentive toward providing consistently *better* products for the future.

Thousands of metal working and finishing plants throughout the United States and Canada know from their own records that Detrex machines and chemicals are unexcelled in performance. Yet Detrex research continues as ever, bringing constant improvements in products and processes —improvements based on 25 years in the engineering chemistry of soil removal—improvements which assure the ultimate in cleaning at lowest unit cost.

For the latest developments in metal-cleaning and allied processes, consult the nearest Detrex office.

In our 25th Anniversary Year, Detrex products include the following: *Degreasing Machines* using Detrex Stabilized Safety Solvents . . . *Metal Parts Washers* for Alkali, Spirits and Emulsion Cleaning . . . *Specialized Metal Cleaning Chemicals*—Perm-A-Clor and Triad Degreasing Solvents . . . Triad Alkali and Emulsion Cleaners . . . Triad Paint Stripping and Spray Booth Compounds . . . *Rust Proofing and Processing Machines* . . . *Oil Extraction Plants* . . . *Drycleaning Equipment*

Bulletins describing all of these products are available on request.

KEEP BUYING U. S. WAR BONDS

DETREX CORPORATION

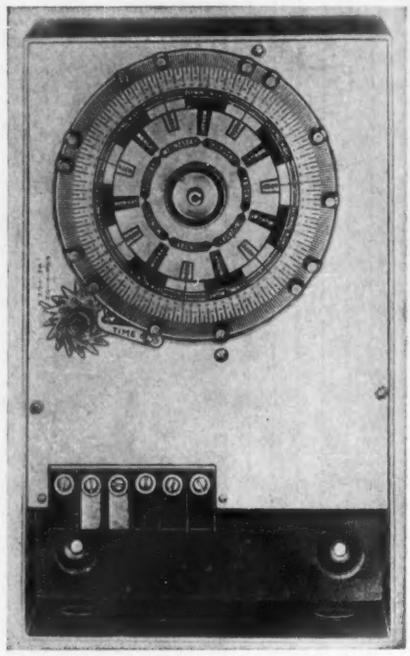
13029 HILLVIEW AVE., DETROIT 27, MICHIGAN

Branch Offices in Principal Cities in U. S. A.

down to a very slow speed as the tool enters the hard spot. When the tool leaves the hard spot, the operator releases the button and the table resumes the normal speed predetermined by the rheostat setting. The new control can be applied on any new variable voltage planer equipment.

Dial Time Switch

Seven day calendar, dial time switches are offered by Paragon Electric Co., 39 West Van Buren street, Chicago 5. The units can be used for timing automatic heat, ventilating, lighting, pumping or flushing operations. These switches are equipped with 6-inch calendar dials which make one complete revolution every 7 days. Dial trippers can be independently set for different daily on



and off schedules. Settings can be made in advance for an entire week. Any day or day's operations may be omitted entirely on a preset program.

On these calendars each day of the week is clearly separated from other days; graduated into hours and half hours; day and night distinctly separated. Operations from on to off or from off to on can be set as close as three hours apart and separately adjusted throughout each 24-hour day in the week.

Reel for Portable Tools

Appleton Electric Co., 1701-41 Wellington avenue, Chicago 13, announces a new spring operated reel for portable tools as well as air and electric devices weighing up to 10 pounds. The tool supports lightweight drills, screw drivers, assembly tools, etc. over production line while operator is otherwise engaged. When operator has finished using a tool, the reel lifts tool up over work and out of the way. It has an adjustable cable clamp which holds tool in position.

CUTS EVERYTHING...ALL OVER THE PLANT...

Wells No. 8— never gets tired!

• This Wells No. 8 Metal Cutting Band Saw has proved itself a handy tool to have in any man's metal working plant. Sturdily made, simply designed, it keeps cutting — most all shapes and types of metals — wherever you need it. It frees large production units for other work. It cuts close—removes a minimum of stock and operators like it because it's easy to use. Then, too, this Wells is portable. You save time and labor by moving the saw to the work. Check up. You'll find a spot in your plant for a Wells No. 8. See your supply distributor for details.

SPECIFICATIONS
WELLS NO. 8

CAPACITY: Rectangular . . . 8"x16"
(Special Guides) . . . 5"x 24"
ROUNDS: . . . . . 8" diameter
MOTOR: . . . ½ H. P., current optional
SPEEDS: . Selective 60, 90, 130 feet per minute
WEIGHT: . Approximately 750 pounds

Products by Wells Are Practical

Wells SAWS

Wells

Products by Wells are Practical

METAL CUTTING BAND SAWS

WELLS MANUFACTURING CORPORATION
1515 FILLMORE ST., THREE RIVERS, MICHIGAN

Take a Tip from the

ANCIENT WARRIOR

He carried only *one* shield. That was his defense against enemy attack. By *placing* it *right,* that one shield was enough. That's the way with your plant equipment. On most jobs you need Stainless Steel only on the exposed surface side.

INGACLAD

STAINLESS-CLAD STEEL

Users of IngAclad Include:

American Cyanamid Co.
Armour & Co.
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Groen Mfg. Co.
Leader Iron Works
Monsanto Chemical Co.
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Solvay Process Co.
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Whiting Corp.
and many others.

has for 12 years proved its protective efficiency in hundreds of America's finest industrial plants. In addition to stretching your "Stainless Dollars," it offers the additional advantages of easier fabrication and better heat diffusion in kettles and other vessels where heat is applied.

Write for special IngAclad folder and Manual of Fabricating and Welding Procedure.

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BORG-WARNER CORPORATION
310 South Michigan Ave., Chicago 4, Illinois
Plants: Chicago, Ill. • New Castle, Ind. • Kalamazoo, Mich.

Machine Tools

(*Concluded from Page* 117)

to the machines and the finished parts.

The use of conveyors of both the roller and power types further simplifies the handling of heavy parts for women workers, while at the same time effecting enormous savings in floor space by eliminating the usual temporary storage at each machine of large numbers of parts in process. The areas normally required for this purpose can thus be occupied by productive machines. This saving, coupled with that effected through the use of a smaller number of machines, makes possible the erection of a smaller plant than would otherwise be required. Referring to the Greenlee transfer machine again, this one machine alone saves more than 3000 square feet of floor space. The smaller plant with its more compact machine lines, in turn demands less supervision, fewer lead men and setup men.

The steady flow of parts produced by the conveyor lines serves to reduce inventories and assures a smooth, easily controlled organization. Aisles may be reduced in width and kept clear for normal traffic; manual or power trucking with its not infrequent injury to parts or personnel is reduced to a minimum.

Space considerations preclude the showing of every special machine and every space and manpower saving device, but the examples given here will furnish a general idea of the type of equipment which has enabled Wright Aeronautical to produce more engine horsepower per man, per machine, per hour than has ever been possible before in the history of the aircraft engine industry.

Aluminum Benches Reduce Danger from Slipping

A line of aluminum benches for men and women who wear rubber boots and work in wet or slippery places is offered by Aluminum Ladder Co., 154 Carbis, Worthington, Pa. The typical No. 2 bench is made of hard alloy aluminum 12 inches wide, 18 inches long and 15 inches high. It weighs 5½ pounds, and the top sheet has an embossed cover to prevent slipping.

These benches may be used in dairies, breweries, distilleries, ice and chemical plants, etc. Feet may be supplied either with wooden shoes or left plain, according to where bench is used.

Booklet on Drill Pointing

A 12-page illustrated pamphlet entitled "Correct Drill Pointing" contains information to help correct production problems and describes the correct procedures for pointing twist drills to be used on all types of materials. Chicago-Latrobe Twist Drill Works, 411 West Ontario, Chicago 10, claims that, if properly followed, the technique described will reduce breakage which may occur with twist drills.

INDUSTRY POLL POINTS TO PLAN-O-MILL!

Here's how **PLAN-O-MILL** *measures up to Industry's demand*

The Bramson Publishing Company's
PRODUCTION POLL
of the Metal-Working Industry

• Staff editors of this publication believe the answers to these questions may guide readers toward an enlightened outlook on postwar mass production. Answers gathered from the field, from the more than 20,000 readers of this magazine and at its PRODUCTION Round Tables each month, will undoubtedly reflect the thinking of the metal-working industry in the U. S. and Canada.

QUESTION	Per Cent Replying YES	NO
1. Do you envision greater precision in postwar manufacturing?	50%	50%
2. Where advisable, will you replace pre-war equipment with war-built or D P C equipment?	70%	30%
3. Are changes in machine tools indicated to fully utilize improvements in cutting tools?	100%	—
4. As a general rule, should machinery controls be changed so as to provide greater motion economy on the part of operators?	100%	—
5. Do you favor electronic controls?	93%	7%
6. Are lubrication systems on machine tools today efficient, adequate and accessible?	3%	97%
7. Do you see a trend toward a reduction in stock removal for finish, by such means as precision forming, casting, forging, stretching etc.?	94%	6%

inadequate. The ... of color ... PRODUCTION Round Table poi...

July 1944—Tool Engineer.

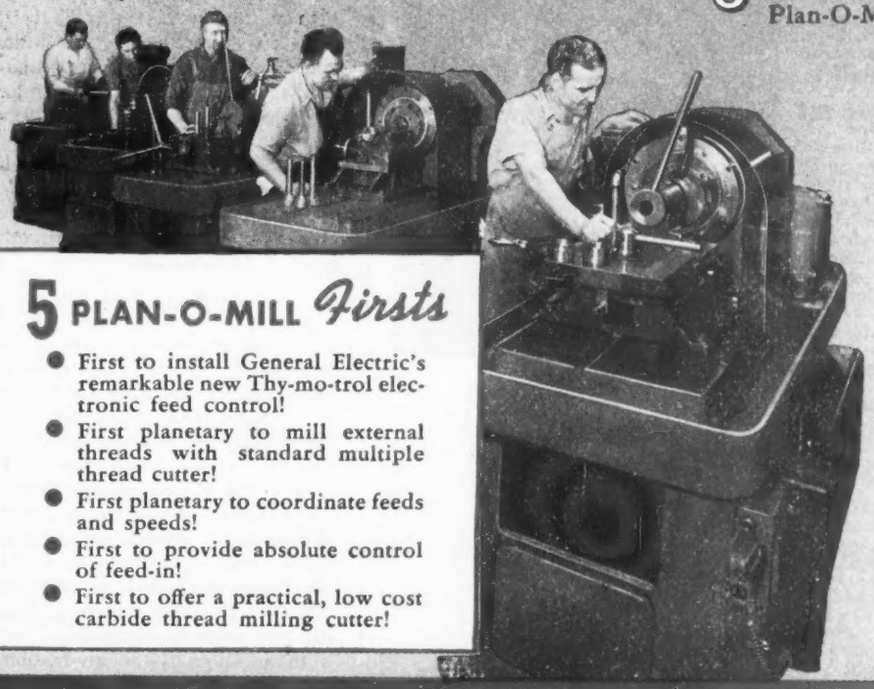
1 Plan-O-Mill does a precision job at a production rate.

3 Plan-O-Mill is up to the minute in efficient use of cutting tools, either high speed steel or carbide.

4 Plan-O-Mill is electrically controlled—one push button for complete cycle.

5 Plan-O-Mill was the first planetary to install electronic feed and speed controls.

6 The answer is "YES" for Plan-O-Mill.



5 PLAN-O-MILL *Firsts*

- First to install General Electric's remarkable new Thy-mo-trol electronic feed control!
- First planetary to mill external threads with standard multiple thread cutter!
- First planetary to coordinate feeds and speeds!
- First to provide absolute control of feed-in!
- First to offer a practical, low cost carbide thread milling cutter!

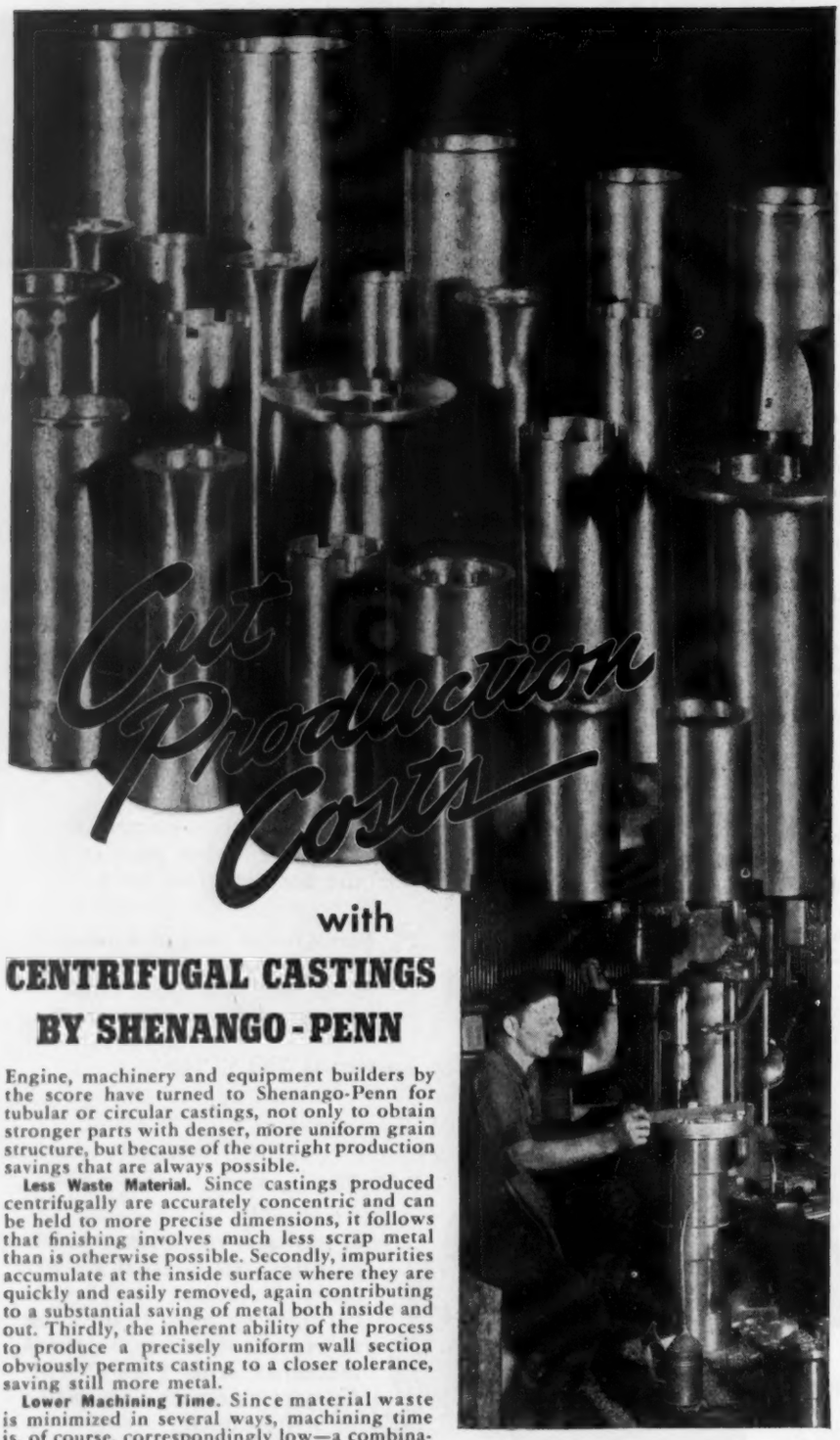
If your war or postwar products involve internal or external threading, or cylindrical forming, now is the time to replace obsolete, wasteful machines with Plan-O-Mill. Contact your machinery dealer or write direct.

THREAD AND FORM PLAN-O-MILL MILLING MACHINES

PLAN-O-MILL CORPORATION

1511 E. EIGHT MILE ROAD • HAZEL PARK, MICHIGAN

THREAD AND FORM PLAN-CO MILLING CUTTERS



with

CENTRIFUGAL CASTINGS BY SHENANGO-PENN

Engine, machinery and equipment builders by the score have turned to Shenango-Penn for tubular or circular castings, not only to obtain stronger parts with denser, more uniform grain structure, but because of the outright production savings that are always possible.

Less Waste Material. Since castings produced centrifugally are accurately concentric and can be held to more precise dimensions, it follows that finishing involves much less scrap metal than is otherwise possible. Secondly, impurities accumulate at the inside surface where they are quickly and easily removed, again contributing to a substantial saving of metal both inside and out. Thirdly, the inherent ability of the process to produce a precisely uniform wall section obviously permits casting to a closer tolerance, saving still more metal.

Lower Machining Time. Since material waste is minimized in several ways, machining time is, of course, correspondingly low—a combination saving that is attractive indeed.

Bulletin 143 gives complete information about Shenango-Penn centrifugal castings including other advantages and specifications of the various available alloys. Write to the Shenango-Penn Mold Company, 453 W. Third Street, Dover, Ohio.

In addition to foundry facilities, Shenango-Penn is well equipped for all kinds of machining and finishing operations. Here flanges of bronze castings are shown being drilled.

ARMY NAVY SHENANGO - PENN P

ALL BRONZES • MONEL METAL • ALLOY IRONS

Metal Marking

(*Continued from Page* 126)

obtained, regardless of lack of uniformity in material.

Hydraulic markers now coming into use roll part numbers, lettering, graduations, etc., on both round and flat surfaces. They have been serving in many war plants, marking components of guns, tanks, planes, engines, etc. At least one concern has paid particular attention to development of hydraulic marking machines—George T. Schmidt Inc., Chicago.

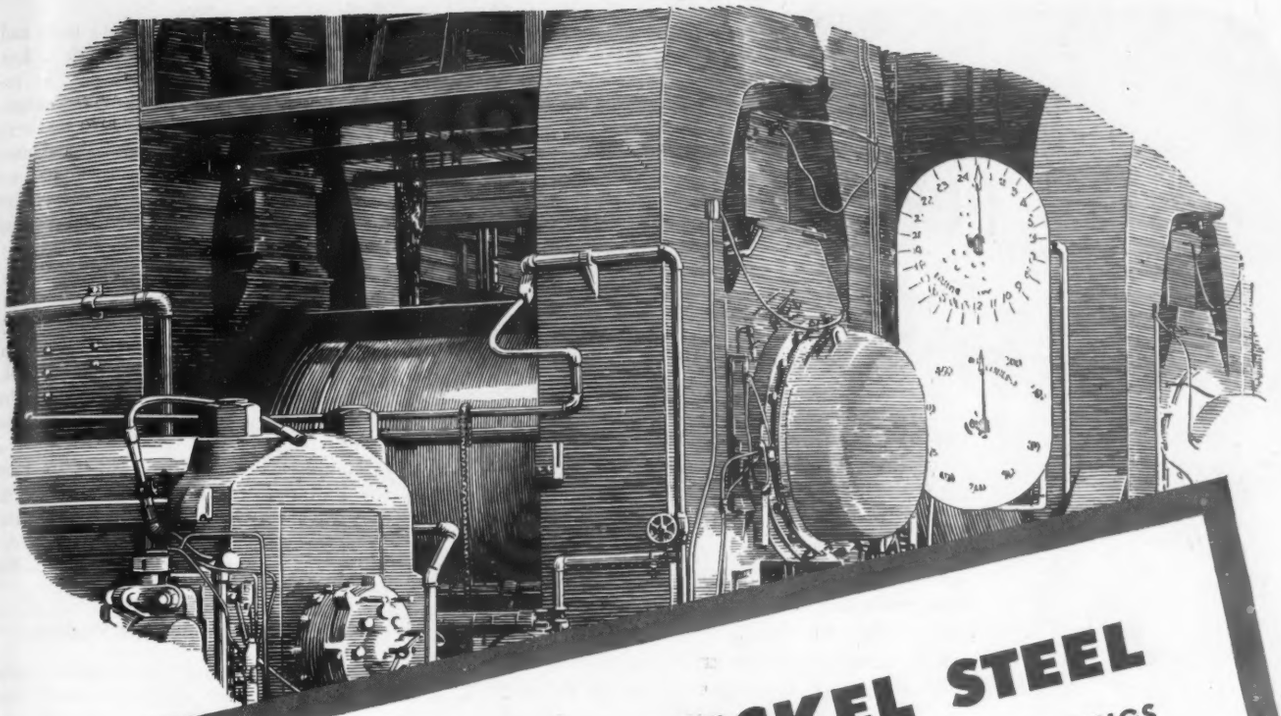
Some leading marking machine manufacturers will equip most of their machines with a pneumatic table pressure or a pneumatic die slide movement, or both, when desired, or will furnish them without the pneumatic feature for shops where great stress is not laid upon uniformity of impression depth. Some of these machines are of so-called universal type, since they may be variously tooled and equipped for marking on many different round, flat or irregularly-shaped pieces. (See Fig. 2.) In some cases, where the machine is provided with both pneumatic table pressure and pneumatic die slide movement, the operator can sit down at the work, his only duties being to feed the pieces into the work holding fixture, and to remove them after the marking cycle is completed.

In many cases, a machine of the universal type is rigged up for lever operation. In some instances, a crank is used for rolling in the impression. This is true especially in cases where it is tooled and equipped for precision graduating of round parts. Where this operation is performed, the circumference being marked and the circumference of the rolling die must be exactly the same, and means must be provided to keep them positively in time. That is, both must make exactly one revolution and come back to precisely the same point, so that if more than one revolution is made, double-marking cannot occur, but the graduations will still be perfect. In order to do this, the workpiece is held on one spindle or mandrel, and the rolling die on another, and the two are positively geared together with perfectly-fitted gears of the same size.

Graduating Machines

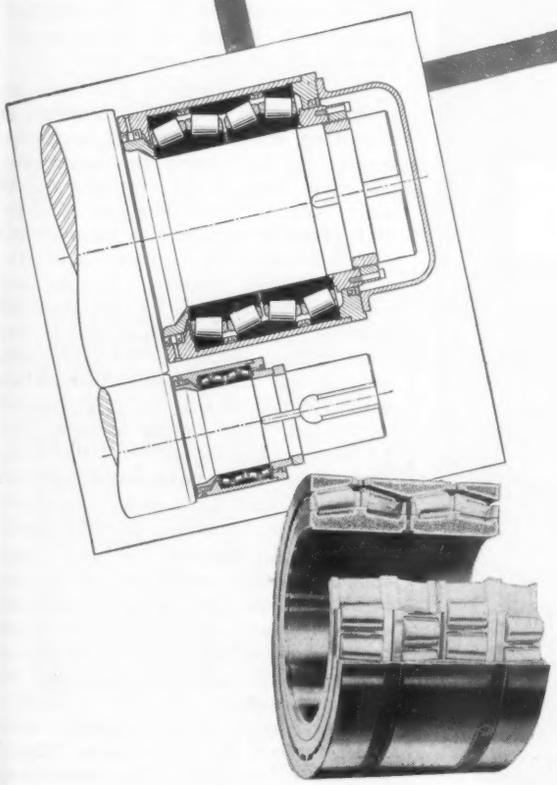
Where graduation marking is done in quantity, special graduation marking machines are provided for the purpose. In all graduating equipment, however, the principle of gearing the die mandrel and the work-holding mandrel together is observed, to prevent any double-marking, and make it possible to give the work two or more revolutions, if desired, for deeper marking. Where conical surfaces are to be graduated, as in tapered micrometer thimbles shown in Fig. 5, the die also must be conical.

In addition to the graduation marks, the die carries the figures and any other characters used in connection, so that both the figures and the graduation marks are rolled into the work in the same operation. Some of the larger graduating



CHROME NICKEL STEEL

GIVES LONG SERVICE LIFE TO ROLL NECK BEARINGS



Built to carry the heavy loads encountered in roll neck applications, Torrington four-row tapered roller bearings provide the anti-friction means that help to pile up tonnage records and lower costs. Made of S.A.E.-E3310 steel (with higher nickel content) for maximum service life, these bearings have the additional advantages of simplicity of design and a lubricating system that is controlled within the bearing itself.

Today, Torrington Bearings are also meeting anti-friction requirements in screw downs, edgers, table rolls, shears, drives, pinion stands and many other steel mill applications. Profit by Torrington's specialized knowledge and wide experience by specifying Torrington Bearings when you order equipment.

THE TORRINGTON COMPANY · BANTAM BEARINGS DIVISION
SOUTH BEND 21, INDIANA

TORRINGTON BEARINGS

STRAIGHT ROLLER · TAPERED ROLLER · NEEDLE · BALL

FOR EFFECTIVE FLUID POWER SYSTEMS

Parker Couplings

Pressure-tight, and protected against leak, shock and vibration, Parker Couplings—a wide variety of types—insure performance in all Fluid Power Systems.

These precision-made couplings are quick to install and quick to service. They meet a broad range of conditions, and have set new standards of performance wherever fluids under pressure are transmitted through tubes.

Parker has contributed many of the most effective couplings and valves made for Fluid Power Systems—both war and peace applications — better products because they are

Engineered by **PARKER**

The Vital Link

In any Fluid Power System, the vital link is the CIRCUIT that carries power from source to job—through tubes. Circuits may be long or short, remote or direct controlled. They go where you want them—around corners and into tight places—transmitting power without shafts, gears, arms or levers.

Designing Fluid Power Circuits is an engineering job. Parker has been at it for 20 years—and that broad experience is yours to command.

★ ★ ★

A Parker engineer will gladly discuss with you the advantages and economies of Fluid Power. Consult any Parker branch office, or write to The Parker Appliance Company, 17325 Euclid Avenue, Cleveland 12, Ohio. Booklet on request.

THE PARKER APPLIANCE COMPANY
CLEVELAND • LOS ANGELES
FLUID POWER ENGINEERING

machines are strictly for round parts and have the pressure applied with a foot pedal, while the work and die are revolved together by hand-crank action. Others of special build are power driven. Fig. 6 shows a power-driven machine, which is used for graduating and numbering conical fuse rings. The rings are held on an expanding mandrel during the graduating process.

Graduating machines for flat parts, such as rules, lineal scales, etc., often mount the workpiece on a table, which travels back and forth on roller bearings. The table movement is actuated by rack, pinion, and handcrank, and is thereby kept in registration with the rolling action of the marking die, which must have a circumference as great as, or greater than the required length of graduation. The die travels twice over the work, and proper pressure is obtained on the die by means of a spring and a cam in the head of the machine.

Cylindrical Production Marking

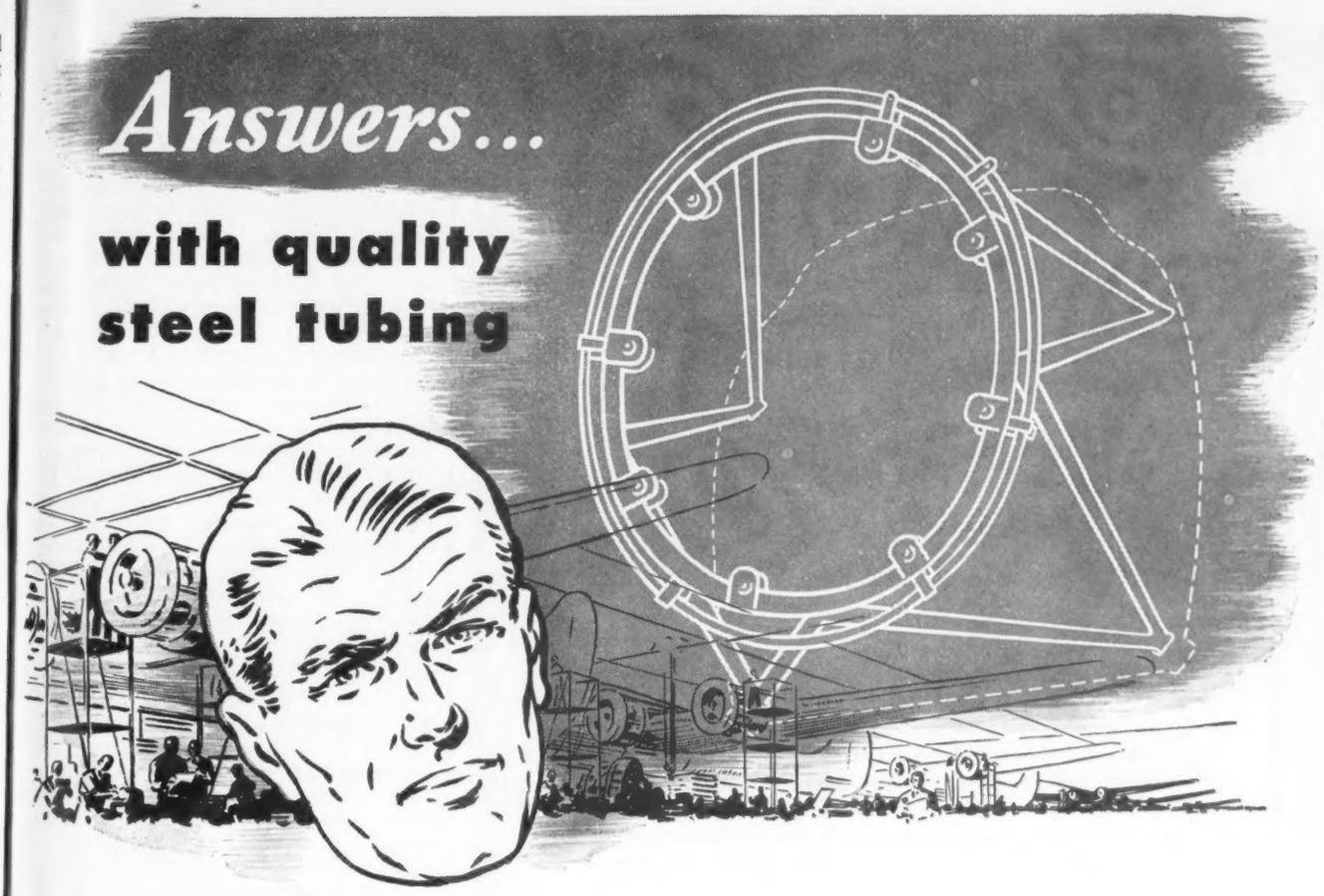
There are many cases where cylindrical surfaces on relatively small steel parts are marked in very large lots and where the use of a continuous-feed machine is indicated. For such work some manufacturers have specialized on the dial feed, with the idea of the workpieces being carried around by the dial in an endless stream and rolled against the die. In such cases the idea is to roll the round workpiece itself, while it is in contact with the die. The die itself is not rotary in this case, but is usually just slightly concave on the face.

Two different kinds of dial feeds are prominent. One of these is described as a vertical dial with notches in its circumference to receive the workpieces, and carry them to the overhung die. In each notch or work-holding recess of the dial there is arranged a pressure roll placed between two carrier plates. The workpiece rolls between the die and pressure roll. Since the pressure roll revolves with the work, there is very little friction involved, and very little wear in the dial grooves. Parts which are cylindrical, so they will roll accurately, are fed to the dial by a chute, (Fig. 4) being picked up automatically. Some kinds of work must be loaded directly into the dial by hand if the problem of chute-feeding cannot be solved satisfactorily.

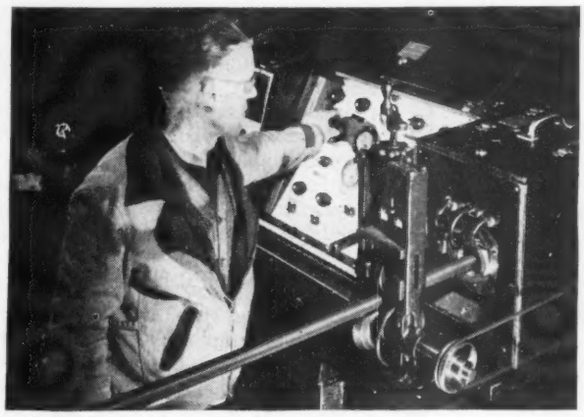
Workpieces which do not have enough cylindrical outer surface to adapt them for placing into a vertical dial, but which do have a flat end square with the axis, are very often fed into a machine of horizontal-dial type. These pieces will rest conveniently on end on such a horizontal dial. It is, therefore, much easier to feed them into units (Figs. 5 and 8) of this kind. The arrangement is such that a pressure dial is mounted on the same spindle with the work-carrying dial, and the workpieces are carried around and rolled between the edge of the pressure dial and the marking die. The pressure dial is of the proper diameter in relation to the diameter of the workpieces to provide the proper con-

Answers...

with quality steel tubing



If you could check at a glance all of the wartime production and structural problems on, say, aircraft engine mounts—or in finding general production short cuts — or in adding superiority to fighting "front" equipment — you'd likely be surprised at the number of "answers" which have been found in steel tubing. Steel tubing offers "strength-weight" advantages in more ways than ever before—a fact revealed in the ever-widening variety of demands on OSTUCO's production.



The "magnetic inspector" — typical of the many machines and operations which constantly "keep an eye" on quality at OSTUCO.

OSTUCO recognizes the tremendous benefits quality steel tubing can offer its customers both structurally—and production-wise. That's why OSTUCO checks quality in every operation. For example, on this page is shown the magnetic inspector which separates analyses and shows up cracks, laps, small cuts and other defects. Dependable *delivery* of quality through the years has earned for OSTUCO an enviable record of low rejects—an enviable reputation for workability and adaptability on the production line.

Are you planning postwar superiority in your field? Why not check with the OSTUCO engineers to see how OSTUCO steel tubing can contribute to that superiority. Simply contact the sales office nearest you:

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KOLD-HOLD MANUFACTURING COMPANY
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tact and pressure on the work as it is rolled. In many cases work is brought to and taken away from these dial-type marking machines by conveyors.

Marking Thin-Walled Parts

Thin-walled cylindrical parts are encountered in considerable volume and variety. These cannot be marked by the dial-feeding methods already cited, due to the fact that the required pressure for marking them is great enough to collapse, crush or deform them. In such cases the problem is solved by mounting the pieces to be marked on supporting, vertical mandrels, these mandrels being mounted on a horizontal dial in circular formation. Tube-type or cup-type parts are often marked in large quantities by this method, which is demonstrated in Fig. 12. The pieces are simply slipped over and down the mandrels, and when carried around into contact with the marking die, only the thickness of the wall is between the supporting mandrel and the die. Thus, there is no crushing effect on the part whatever.

This situation becomes complicated in some cases, where the piece to be marked is quite long and of small diameter. Then the supporting mandrels used do not have sufficient strength to withstand the necessary amount of pressure against the marking die without bending. In such a case a combination of a pressure dial and supporting mandrels is used. Inside the circular formation of supporting mandrels there is a pressure dial, so that the mandrel supports the thin-walled part, and, if and when any deflection of the mandrel begins, it is in turn supported by the pressure dial behind.

As a rule, thin-walled parts are sufficiently uniform that no pneumatic compensating feature is needed to provide uniform depth of impression, but in a few cases it is added. Sometimes, too, special compensating spring pressure is provided in the die holder. Marking dies for dial-feed machines often are arranged to receive interchangeable type pieces. Parts having sufficient wall strength to withstand marking pressure should not be processed on supporting mandrels, since this increases the cost of the operation to a considerable degree. But ferrules for tool handles, stainless steel vanity cases, valve parts and many other products demand the use of supporting mandrels.

Marking Strip and Bar Stock

In marking strip and bar materials, the method employed is usually that of passing the stock through between two driven rolls, which are of equal circumference, and geared together. Such an arrangement provides for rolling in the marking at required intervals. For this purpose, individual roll diameter must be the same as the distance from mark to mark, on mark centers, or the individual roll diameter must be a multiple of the required distance between marks, for more than one mark per revolution. Rolls are very often fitted with interchangeable marking segments, so the same machine and rolls can be used for

Umbrellas are not always for weather protection. To the Navy the "umbrella" is the protecting layer of five-inch anti-aircraft gun fire during enemy attacks, an "umbrella" that keeps heavy bombers high and ineffective.

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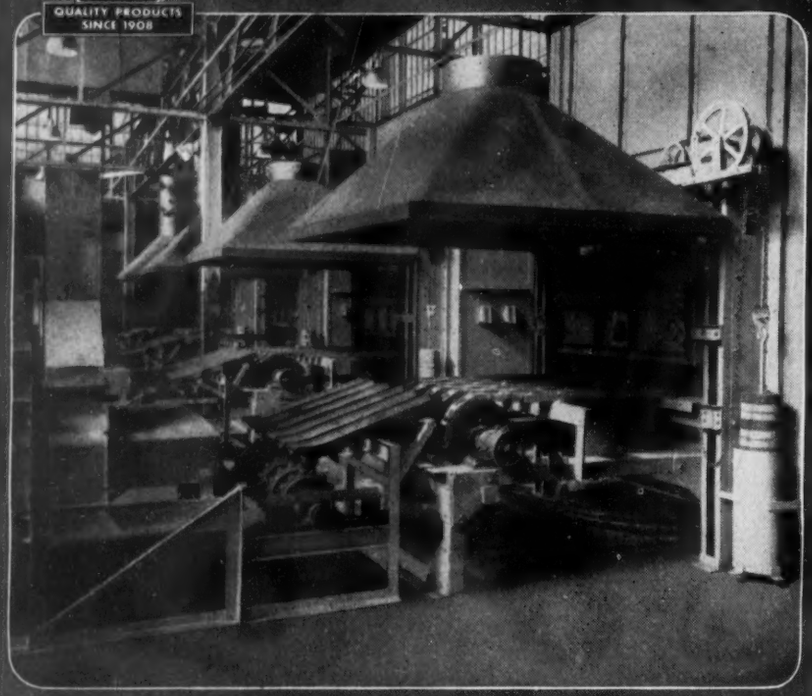

Illustration: Discharge ends of convection type draw furnaces where the heat treatment of heavy artillery shells is completed after the shells are hardened and quenched.

The continuous furnace is a production line machine which not only eliminates costly materials handling, but lends itself to accurate temperature control as well. Uniform physical properties are obtained in the process. Ductility and elongation are held to specified limits.

Continuous automatic operation throughout each of the four complete units requires a minimum of manpower.

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different kinds of marking on strip and bar stock.

Not infrequently special marking machines are literally designed and built around the particular part to be marked, where the job is one of large quantity. One company which specializes in marking equipment has built a hand-stamping press (Fig. 10) especially for marking round spark plug parts, and a power stamping press, similar to that shown in Fig. 11, especially designed for flat automobile nameplates. Another machine designed by the same company is a production marking press made especially for conical fuse caps. Hand and power marking machines for round or flat parts or products are made by some firms for almost any desired capacity. Another unit hand-operated, for marking nonferrous parts, appears in Fig. 13.

Pantographic Mark Reproduction

You may have noticed pantographic machines as used for engraving without thinking of them especially as marking machines. It is a fact that the pantographic principle has been applied to certain kinds of marking, and this is very convenient in a good many cases. There is in fact one machine of bench type (Fig. 14) incorporating a pantograph, which combines three operations in the sense that it can be used for any of the three. One of these is engraving, another is electric-marking or etching, and the third is acid-etching. Rapid, clean-cut marking is readily accomplished on this little unit.

It also has been observed that one of the leading builders of pantographic units for various purposes has provided an arc etching machine of pantographic type. It reproduces a master outline in workpieces of different types and shapes. One of its chief uses is identification marking of cutters, cylinders, collets, V-blocks, bushings, gages, pins, feelers and various other products. The work is held in a vise or holding fixture. The pantograph connection between the tracer and the etching head may be set for a 3:1 or a 6:1 reduction between the master and the work, depending on the degree of accuracy desired, or the size of workpieces being handled. One of these units is shown in action in Fig. 15 marking four ball sockets per minute with permanent inscriptions. Etching depth is controlled by amount of current used.

Mass-Production Etchers

Etching machines can be and sometimes are fitted with a multiple-head attachment in such manner that from two to six etcher heads are controlled by one pantograph. A simple parallel-motion device maintains a relatively parallel movement of the head frame on which heads are mounted. Whether they have a single head or use a multiple-head attachment, as shown in Fig. 16 where four are mounted together, machines of this kind are adaptable for etching a variety of sizes and contours, flat or curved, such as gears, connecting rods, collets, gages, bushings, hardened pins, and similar small parts.

New MUREX WALL CHART

A helpful guide to selecting the right Electrode for the job

This new chart, just off the press, contains a complete list of Murex Electrodes divided into four groups for quick reference; mild steel, special steels, stainless steels and hard surfacing. Electrodes are described according to AWS-ASTM class. Color identification, recommended current strengths, polarity, and physical properties are also given. In addition, there are brief descriptions of the electrodes' general characteristics and applications.

The chart is 24" x 37", printed in four colors.

Copies will be sent free to those who request them on their company letterhead.

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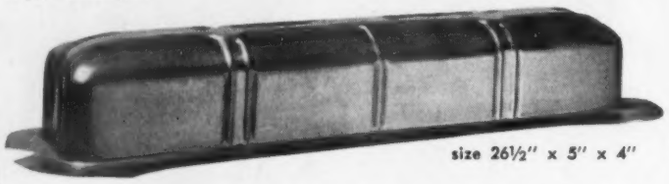
KONDOR DRAW requires 10% to 15% less pressure and speeds up production with no wrinkling.

KONDOR DRAW will make your tough metal drawing jobs easier and more economical as it did on this job.

HERE WAS THE TROUBLE

Difficulty in degreasing the lubricant used and an average of 8% breakage.



size 26½" x 5" x 4"

20 gauge cold rolled stock, drawn from blank in one operation as shown in unretouched illustration of a rocker arm cover case.

ANALYSIS OF TROUBLE

It was necessary to hand clean each part. Breakage on certain steels required very rigid metallurgical specifications.

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Forging Practice

(*Continued from Page* 131)

gravity is the only downward force used in the board drop hammer. In addition to delivering a faster blow, a certain amount of control can be exercised by regulating the amount of steam used. Precision forging can be done on the steam drop hammer as it is guided similarly to the board drop hammer. However, larger forgings of intricate shapes can be handled as this type of hammer is available in sizes up to 35,000 pounds. These hammers are also used for general drawing, swaging and fullering operations.

The Lynn River Works has in operation two steam drop hammers of 2000 pounds rating and one of 1000 pounds rating. Products of these hammers include the following types of forgings.

Name of Part	Material Used
Governor disks (30 lb.)	SAE-1045
Gyroscope wheels	SAE-4340
Bubbler brackets	SAE-1020
Inspection covers	SAE-1020
Pump casings	SAE-1020
Governor bracket	SAE-1020

The five steam hammers in the Schenectady Works are rated at 800-7000 pounds and produce the following forgings:

Name of Part	Material Used
Lifting eyes, ring gears, crankshafts, lifting lugs, commutator clamps and clamp rings	SAE-1045
Retainer rings, lifting lugs, ring gears	SAE-1020
Valve blocks	SAE-1045
Trunnions	SAE-1020
Gears, box wrenches	SAE-4140, NES-9435-45
Crankshafts, end plates	SAE-2340
Back plates	SAE-4643

(c) Manually Controlled Steam Hammers: The source of power in this type of hammer is similar to the double action steam drop hammer. It is, however, of a different construction. The ram is guided only part of the way to the lower die, and in some cases it is not guided at all (in which case the piston is of extra-heavy construction). As it is adapted for a different type of work than the steam drop hammer, its framework is built differently.

Both single and double frame hammers are in use, usually so arranged to allow more room for the hammersmith and his crew to handle the work of various sizes and shapes. In operation, it is manually controlled by the hammer driver. He operates, by hand, two levers—one of which controls the amount of steam used (and, therefore, the power of the blow). The other lever controls the height to which the ram is raised.

While this type of hammer is not particularly adapted for doing precision work on contour forgings, it is used in doing a wider variety of types of work than any other hammer. It is the type generally used in steel mills for forging ingots into billets and drawing into longer bars. With flat dies, it is used in upsetting large disk forgings and punching rings, and with a mandrel or saddle

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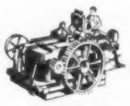
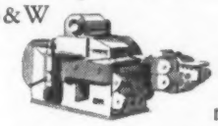
NO. 2 *Automobiles*

THE *Carriage Trade* . .

FROM JOLTING JOGGING TO SMOOTH SAILING



The "Carriage Trade" has come a long way—from the jolting, jogging 5-mile-an-hour pace of the middle 1800's to the smooth comfort of today's mile-a-minute "cruising" . . . Like the carriage industry of 100 years ago, the automotive industry, through all the auto's progressive stages, has called upon RB&W for bolts, nuts and other fasteners to keep a car's body and soul together in the face of stress and shock . . . and, everlastingly, to speed up its production . . . Not by accident of birth did RB&W win the position it holds in the fastener industry. RB&W pioneered from its very



beginning a century ago, by developing such machines as the first automatic cold header. And today, from raw material to finished product, RB&W bolts and nuts are produced by the finest machines and methods available (many of them developed by RB&W engineers), backed by 100 years of "know-how" checked, proved and *improved* by continual research and development . . . That's why—no matter *what* shape or form the "carriage" of tomorrow will take, the automotive industry—like the builders of railroad and marine equipment, farm implements, construction and power equipment and others—will find RB&W ready with bolts and nuts of the proper strength, accuracy and finish—*as always.*

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it is used for drawing out large rings. Almost any kind of rough forging can be made on this type of hammer and, with the use of special tools, the stock can be sheared, chipped, shaped or straightened while on the hammer.

Through careful co-operation between hammersmith and hammer driver, the strength and rapidity of the blows can be regulated to suit the occasion. The blacksmith frequently uses this type of hammer in conjunction with his sledge and anvil when making special parts. These hammers are available in a wide variety of designs and sizes from 400 to 50,000 pounds. Some types include a rocker arm which may be used for continuous automatic action.

Fig. 25 shows an 50-pound manually controlled steam hammer in operation at General Electric's Schenectady Works forge shop. It is used to make small hand forgings.

The Lynn River Works has eight steam hammers in operation, ranging in size from 600 to 12,000 pounds. These include single and double frame, ring and flat die hammers. Some hammers are used in combination with others. Light forgings produced on the smaller steam forging hammers at the Lynn River Works (hammers 4000 pounds or lighter) include the following:

Name of Part	Material Used
Railway pinions	SAE-1045, SAE-1060
Turning device worms	SAE-2515
Small auxiliary reduction gear pinions	SAE-1045, SAE-1060
Reduction gear couplings	SAE-1045, SAE-1060
Small rings, miscellaneous shafts	SAE-1045, SAE-4140

The Schenectady Works operates seven manually controlled steam hammers, ranging in size from 400 to 12,000 pounds. Some of the forgings produced on these hammers are:

Name of Part	Material Used
Retaining and misc. rings	SAE-4340
Centering rings	SAE-4140
Fan shrouds	SAE-4340
Impeller and impeller casings	Stainless type 410
Shafts	SAE-1020
Thrust collars	SAE-1030
Water shields	SAE-4340
Steam turbine nozzles	Stainless type 410
Clamping rings	SAE-4140
Wheel forgings	Stainless type 410
Gear blanks	SAE-4340, SAE-4140, NES-9435-45
Tools	Hi-speed Steel
Tool shanks	Carboloy

These hammers are also used for drawing out and working of billets into sizes and shapes suitable for subsequent forging.

(d) Air Hammers: The air hammer is similar in both construction and operation to the steam hammer except for its source of power, compressed air. It is available in both the drop forging type and the manually controlled type of hammer. It is cheaper to operate, but is not available in the large sizes that the steam hammer is. However, it is popular as a smaller hammer as its action is more rapid than the mechanical types. A 5000-pound air hammer is shown in Fig. 27.

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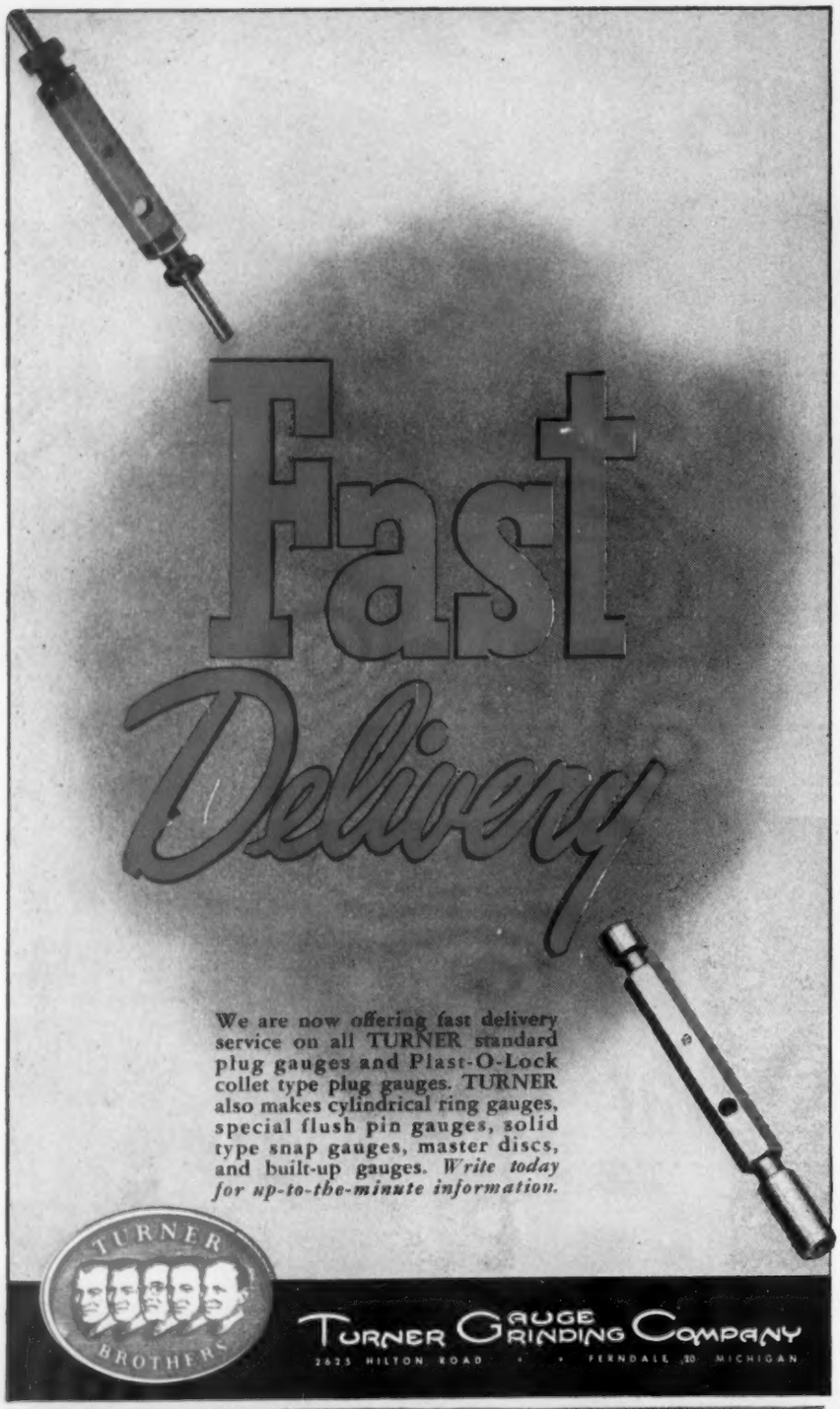
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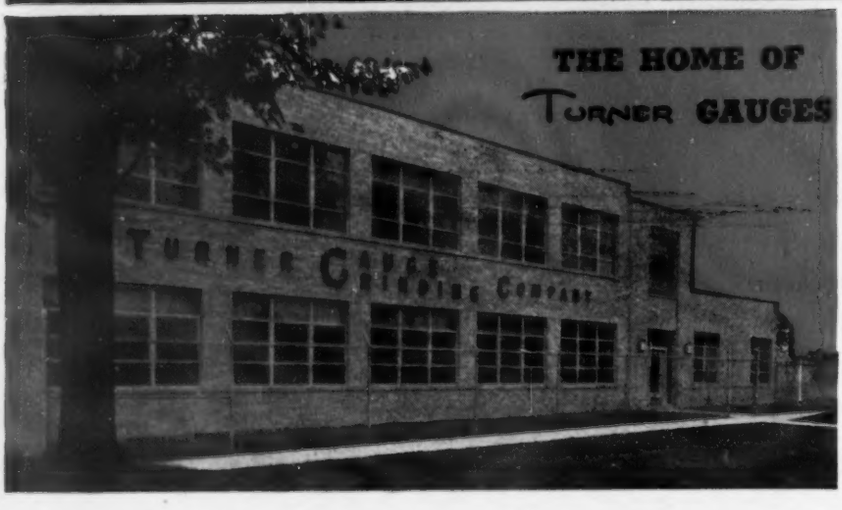

at the Lynn River Works. This is a 175-pound hammer and is used for drawing out ends of turbine bucket stock. The slugs are cut into double bucket lengths and both ends are drawn out on the flat dies of the air hammer. The drawn ends are later drop-forged into the blade section of the buckets. The air hammer is especially suitable for intermittent operations such as this.

The Schenectady Works has two air hammers in operation which are rated at 2500 and 5000 pounds respectively. Typical forgings produced in these hammers are as follows:

Name of Part	Material Used
Ring gears, lifting lugs..	SAE-1020
Cummutator clamps, clamp rings, crankshafts	SAE-1045
End plates, crankshafts.	SAE-2340
Gears	SAE-4140
Box wrenches	SAE-4140, NES-9440
Back plates	SAE-4643

The Schenectady Works also operates an electric-air hammer, rated at 350 pounds, which is used for forging chisels, scrapers, and other small tools of this type.

(e) Trip or Helve Hammers: This type of hammer is mechanically operated. A rocking lever lifts the ram which then falls by gravity. It is frequently used in cases where a small power hammer is needed and especially in plants where steam or compressed air are not available. As it is continuous in operation when the treadle is depressed, it is not subject to as much control as certain other types of hammers; however, it is commonly employed in conjunction with the blacksmith sledge and anvil in hand forging work.

The Lynn forge shop has in operation two helve hammers in the 75 and 100-pound sizes respectively. They are used mostly in making forged cutting tools. They may also be used for drawing out thin sections of bar stock of various alloys for experimental purposes.

(f) Sledge Hammer Forging: This is the most ancient forging method and for some purposes cannot be replaced. The blacksmith has added some ingenious forming tools to his equipment (consisting of sledge hammer, bick anvil, and hearth), and now uses small power hammers in conjunction with his hand forging. He handles most of repair work requiring forging or hammer welding operations. Among other things, he repairs chains, makes and repairs tongs, and forges tools and various small articles. His special tools include chisels, punches, bending tools, flanging tools of various sizes and shapes, swages, drifts, fullers, hot and cold sets, hardies, flat-headed smoothing tools and gouges. His equipment also includes a variety of tongs of different sizes and shapes, most of which he makes himself.

—o—

A 4-page publication, "Ropeology," by Macwhyte Wire Rope Co., Kenosha, Wis., contains a collection of wire rope users' experiences and discussions of the science of wire rope application in many classes of service.

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- These features, many of which are usually found only in large industrial furnaces, insure stability, maximum efficiency and economy of operation.

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Complete data covering specifications, additional applications and ordering instructions are included in this new bulletin. Write for your copy today. Ask for Bulletin No. 50.

COOLEY ELECTRIC MANUFACTURING CORP.
38 South Shelby Street Indianapolis 7, Indiana

Arc-Spark Stand Provides Spectrographic Analyses

Combining the desirable features of the conventional stand for general arc work, of the jig-loaded stand for metal-rod analysis, and of the Petrey stand for metal-plate analysis, an arc-spark stand for spectrographic work is completely enclosed. The door is furnished with a safety switch to obviate the shock hazard and with a dark red transparent plastic panel allowing good discharge visibility and providing eye safety. The stand is constructed from large aluminum castings. Steel electrode holders are water-cooled, while insulated tubing on the water system prevents power leakage or breakdown, even when used with a high voltage spark unit. A friction drive for electrode positioning insures smooth operation and adjustment accuracy. It provides a 1-inch continuous travel on both upper and lower holders, a minimum spacing of 5/8-inch between holders and a maximum of 2⅝ inches. Calibrated stops limit each electrode holder's motion at top and bottom and are adjustable to 0.002-inch with a vernier knob, permitting duplication of many settings.

Differential Tension Maintained

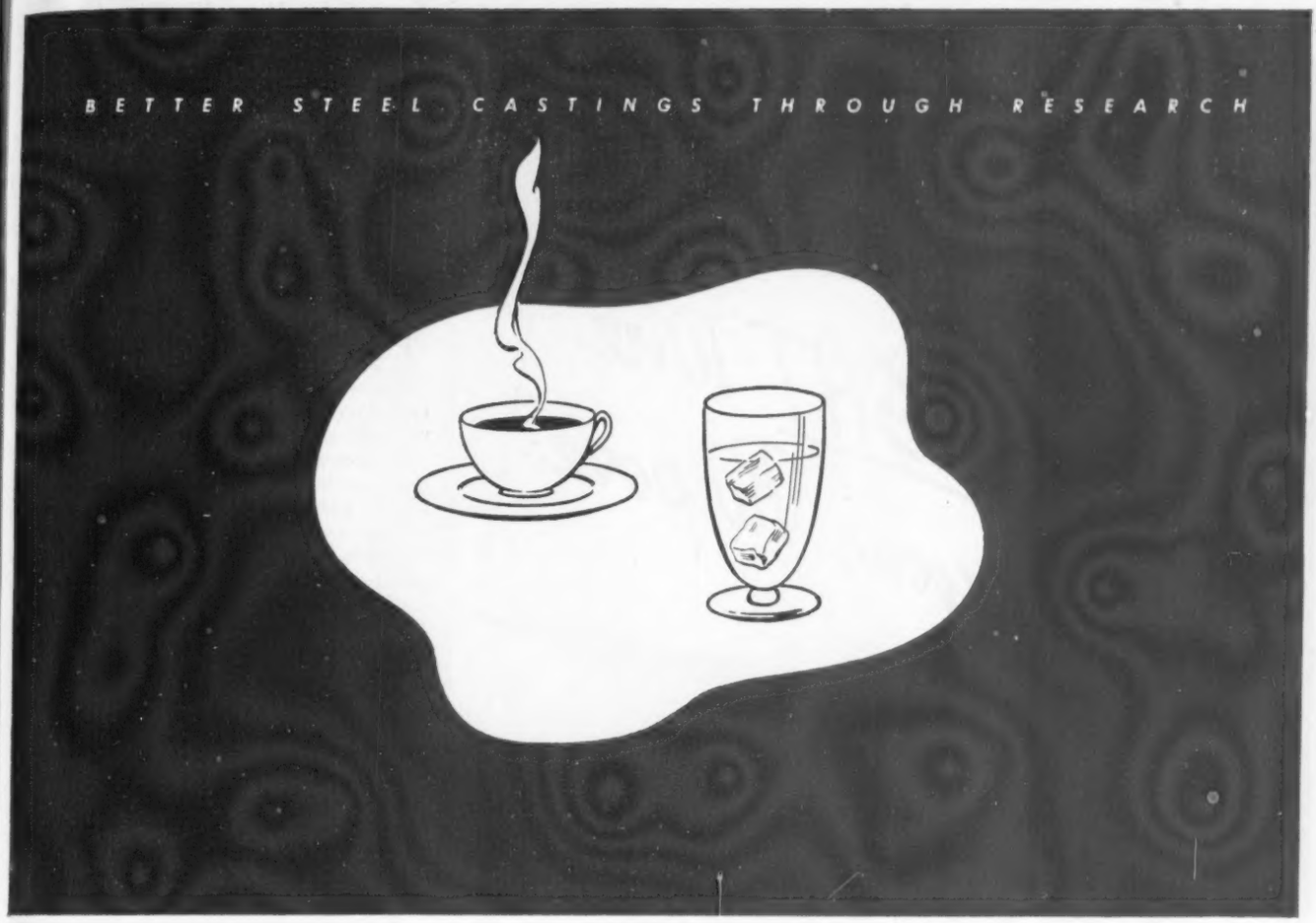
For use as a jig-loaded stand, holders are locked in place and an accompanying jig is used for spacing sample rods. Another jig may be used for spacing rod-carbon electrodes for arc work. A differential tension between upper and lower electrode holders is maintained so that the upper electrode may be racked against the lower for striking the arc and providing exact spacing. The lower electrode holder takes a 6-inch length of high purity graphite when that material is used as a counter electrode.

This instrument is convertible for use with flat specimens by raising the upper electrode out of the way or completely removing it and putting into place a rotary table pinned for exact positioning. This rotary table allows sparking at three positions on the flat specimen sample by moving the external lever. A 3-degree table tilt prevents shadowing the discharge by the sample overhang. Sample height is maintained equally for all three positions and the table height is adjustable to 0.001-inch with a knob and scale, allowing duplication of various electrode positions. A fourth position on the external lever provides a gage over the lower electrode, allowing for spacings of 1, 2 or 3 millimeters between sample plate and counter electrode.

A positive sample holder is a feature of this stand, exerting spring tension against the flat specimen top, thus insuring electrical contact at all times, regardless of the condition of the sparking surface.

The unit includes high tension cables eight feet long permanently fastened, with high current capacity and good insulation. Insulation in the stand itself is said to be adequate due to specially formed ceramic insulators.

Overall dimensions of this unit, man-



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Airplanes can now fly seven or eight miles above the earth, where thermometers register 60 to 70° below zero.

Steam turbines run at 1200°—hot enough to turn hard steel cherry red.

The steel castings that are component parts of the engines that work under these extremes, and over the wide range in-between, are conditioned for their jobs by scientific metallurgy and by heat treatment.

We start with alloys that have a certain amount of natural ability to endure very high or very low temperatures, or alloys that have any other combination of properties called for by the job.

And then these properties are enhanced by heat treating, which has developed into a very exact science.

Research has given the steel founder a lot to work with. Tell him what conditions you want to meet, and he can provide steel castings with prescribed-in-advance mechanical properties.

If you let your steel foundry work with you at the planning level, you can be sure of results—sure of satisfactory performance in the finished product.

Published by the Steel Founders' Society of America, to tell you about its organized Research Program.

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PAGE can answer such questions for you. And, in answering them, **PAGE** may show you how to simplify, economize or speed up your production. For **PAGE** experience includes the use of wire in the making of other products—as well as the manufacture of practically any kind of wire.

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PAGE offers a wide range of electrodes for welding iron, carbon steels and the various analyses of Stainless.

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PAGE STEEL AND WIRE DIVISION
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ufactured by Harry W. Dietert Co., 9330 Roselawn, Detroit 4, are 9 inches wide, 14 inches high and 8 inches deep, with a total weight of approximately 30 pounds. Construction is claimed to be rugged, and extraneous parts may be removed when not in use, permitting it to be used in laboratories handling a variety of spectrographic work or on the production line.

Problems Solved by Special Calculator

Mathematical problems which would take several years to work by conventional methods are now being solved in a few days by use of a recently perfected differential analyzer. This machine, consisting of an interconnected system of shafts, motors and gears, employs mechanical elements for addition, subtraction, multiplication and division, and electromechanical elements for more complex functions. Practically all of the gears and couplings are removable and must be set up in a different arrangement for each new problem.

According to scientists, almost any physical phenomenon can be expressed in terms of differential equations. Since this analyzer is fundamentally a tool permitting rapid solution of such equations, it can be used to solve many problems of an important nature whose correct answers were until now only guessed at.

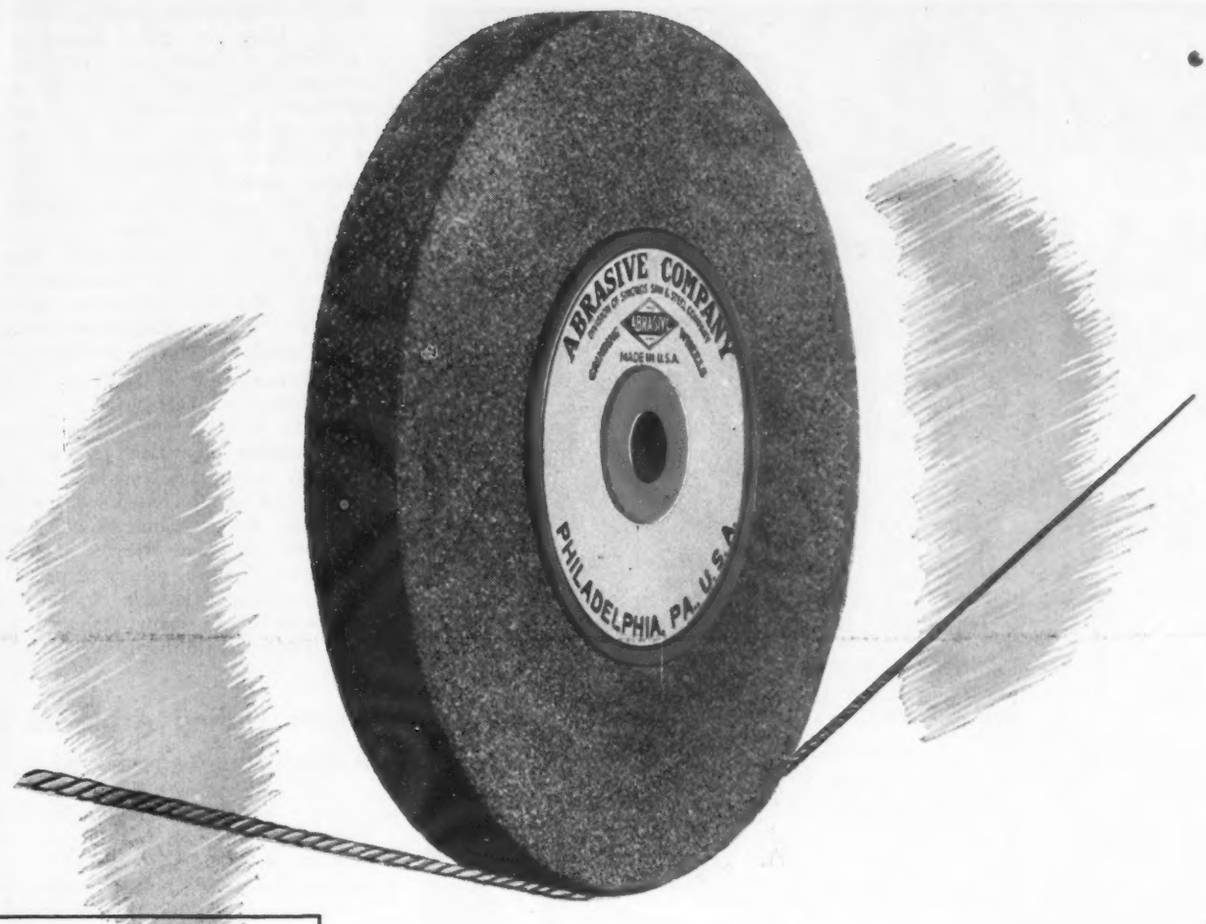
Most important element of this new analyzer, developed by General Electric Co., Schenectady, N. Y., is a polaroid photoelectric system of unique design. Fourteen of these highly sensitive devices are installed on the machine, permitting the accurate, speedy solution of differential equations requiring as many as fourteen simultaneous integrations.

Pens Plot Curve

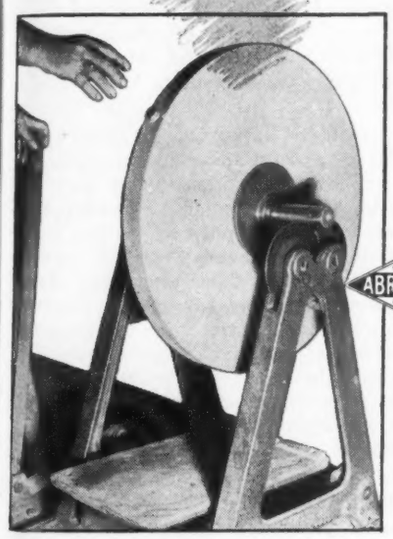
In appearance the analyzer resembles a long maze of shafts and gears with four input tables and two output tables extending to one side. When the machine is in use, the variables in the differential equations being solved are represented by the rotation of shafts in the machine. These are connected with mechanical pens on the output tables. As the shafts speed ahead to solve the equation, they move the pens which plot an accurate curve in accordance with the quantities worked out by the continuous movement of the shafts. Interpreted correctly, this curve gives a graphic solution of the problem.

Before the analyzer is put into operation, the problem must first be set on the machine. To do this, necessary equations are arrived at and various shafts and gears are interconnected so that all the quantities in the problem will be represented. After the machine is set to work, technicians may grind into it by means of the input tables required mathematical functions, if more are needed, to obtain a final solution.

Similar differential analyzers were first developed by Dr. Vannevar Bush, form-



BALANCE



Sensitive balancing ways are used to make certain of the accuracy of Abrasive Company Grinding Wheels.

Balance might be the one word to describe Abrasive Company excellence. Mechanical balance is essential for efficient grinding and is a "must" in every Borolon and Electrolon Grinding Wheel. Balance prevents vibration and chattering; and lengthens the life of valuable grinding machinery. Balance starts with selection of raw material, and the manufacture of abrasive grains. Hundreds of balanced formulas produce just the right bond for many combinations of grade and density. Balanced control of molding processes; balanced regulation of kiln heats and operation; balance in the finishing; and balance in tests and inspections are all basic to quality in Abrasive Company manufacturing.

Balanced inventories in factory stock and on distributors' shelves make Abrasive Electrolon and Borolon Grinding Wheels; Segments; Mounted Wheels and Points; Grains, Bricks, and Sticks available for your every specific abrasive requirement.

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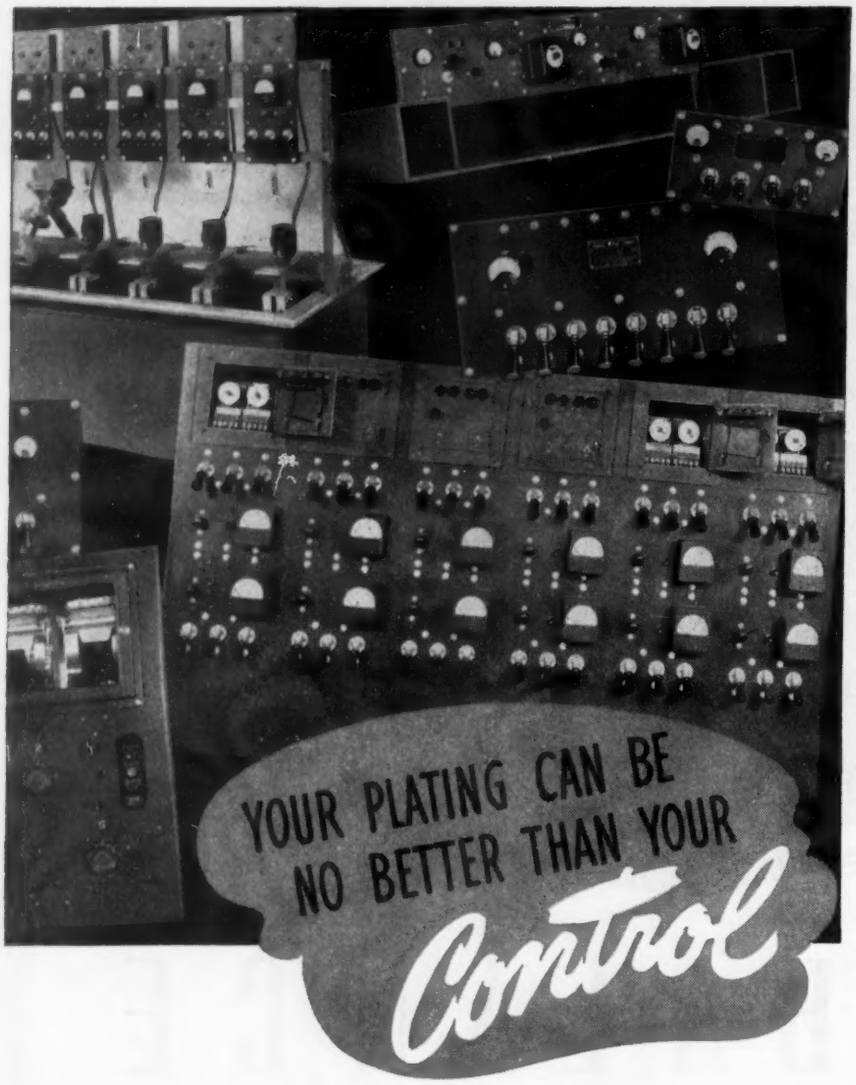

TODAY as never before, plating to accurate specification is a necessity and such accuracy can only be accomplished by absolute CONTROL of both time and plating current.

Udylite has been a pioneer in close tolerance plating—Udylite engineering and control equipment have earned a well deserved reputation for dependability and superiority as a result of their fine record of performance.

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erly of Massachusetts Institute of Technology. Later the Moore School of the University of Pennsylvania and Massachusetts Institute of Technology made modifications and further improvements. When this company began construction of its analyzer, it patterned the mechanical part largely after those already in existence, adding some features of its own development. Most important of these was the photoelectric follow-up system used with the integrator. This improved the performance of the analyzer by attaining a shorter solution time with a greater degree of accuracy.

By making use of such mechanized mathematics, engineers have been studying many complex physical problems, a great number of which are related to the war. Applications made of the machine so far have included such problems as radar, hydrodynamic flow, rotating machinery, airplane stresses and speed governors. Future use is expected to result in greater knowledge and better understanding of many technical problems which were hitherto unsolved.

Faster Plating Achieved by Adjustable Anode Rod

Faster plating of irregularly shaped parts and more uniform and even tempered metal deposits are being achieved through the use of a new adjustable anode rod invented by William G. Evans of the plant and equipment department and William C. Shaefer of the detail manufacturing division of Glenn L. Martin Co., Baltimore.

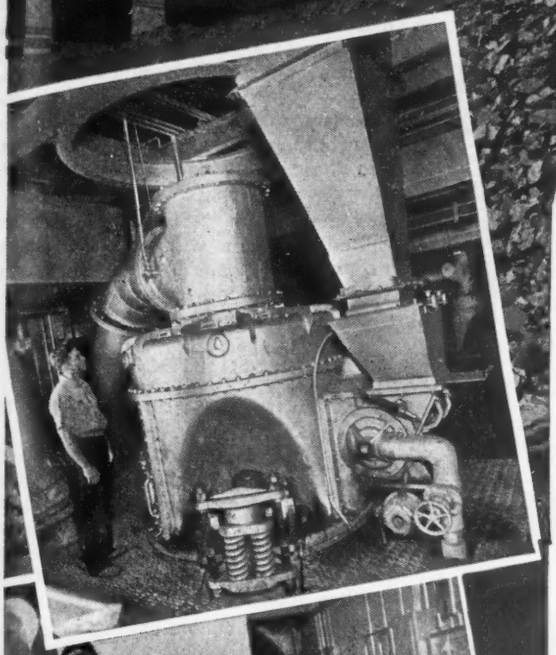
It is said to be possible to move the anodes to the most advantageous position in relation to the work being plated, permitting faster plating of irregularly shaped parts and rapid and positive adjustment to accommodate several types of plating work without electrically disconnecting the anodes from the source of power. At the same time the proper placement of the anodes made possible by this adjustable rod provides a more even disposition and finer texture of the plating material, and reduces the amount of current required.

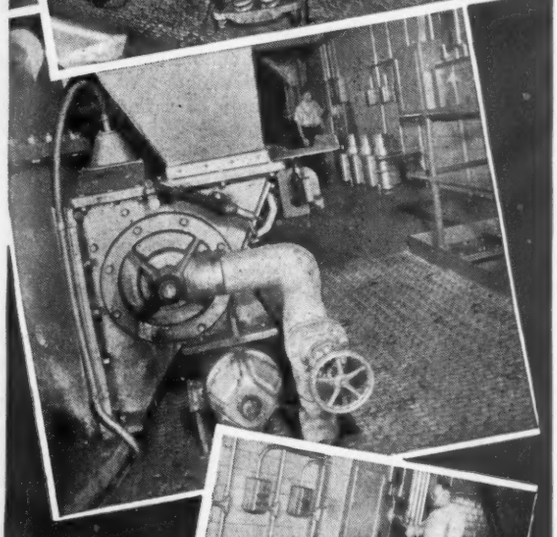
Designed for use with elongated, mass-production plating tanks, the new installation consists of brackets welded, bolted or riveted to the walls of the tank to which steel plates or arms insulated on either side with phenol fibre are pivotally attached. At the outer end of these plates or arms are swivel fittings on which are mounted annular clamps containing insulators which surround and support the anode rod. The insulators are formed in two halves so that they may be easily installed and clamped in place around the rod. Anode baskets containing chunks or balls of the metal to be deposited are hooked over and supported by the rod.

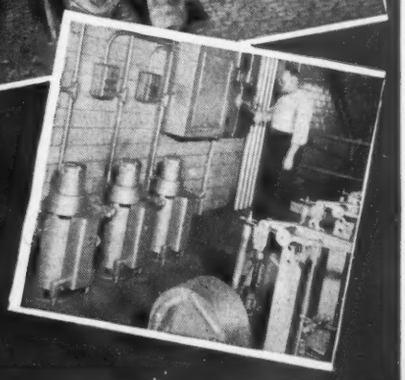
Current is supplied through a flexible cable attached to one end of the rod, while an insulated handle is provided at the other end to permit the operator to adjust the rod as he sees fit. The rod

"MOTOR-DRIVE IS MORE THAN POWER"

RELIANCE V★S DRIVE







INVESTIGATE THE POSSIBILITIES of *All-Electric* V★S DRIVE

OPERATING FROM A-c. CIRCUITS!

CONSTANT MAINTENANCE of a desired steam pressure from boilers is important in power company operation. To you, who may not need to worry about this problem, the fact that it is being handled automatically with the help of Reliance V★S Drive should nevertheless be interesting. It is a good indication of the wide variety of uses to which V★S Drive may be put.

"Reliance V★S" is an all-electric, adjustable-speed drive for A-c. circuits that provides for starting, stopping, speed-changing, smooth acceleration and deceleration, jogging, inching and other operations. All are centrally controlled from a conveniently located panel. Production machinery output is being increased, quality and uniformity of products improved, operator fatigue decreased and operation and maintenance costs lowered by many V★S Drive applications in many industries.

If you haven't investigated Reliance V★S Drive in relation to your own work, we suggest that you call in a Reliance Application Engineer.

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Birmingham • Boston • Buffalo • Chicago • Cincinnati • Detroit • Greenville (S. C.) • Houston
Kalamazoo • Los Angeles • Minneapolis • New York • Philadelphia • Pittsburgh • Portland (Ore.)
St. Louis • San Francisco • Syracuse • Washington, D. C. • and other principal cities

Each of the 14-ton-per-hour mills (upper photo) serves one 500,000 pound-per-hour boiler. Amount of coal fed into each mill, and thence to its boiler, is regulated by a Reliance V★S Drive unit, three of which are shown in above illustrations.

RELIANCE A-C D-C MOTORS

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BENDING AND STRAIGHTENING MACHINES

PUNCHING AND SHEARING MACHINERY

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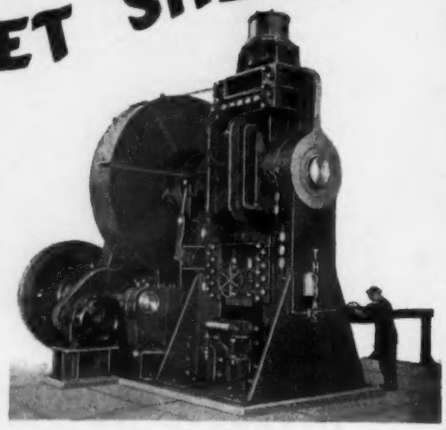

Illustrated is No. 26, capacity 8" square. Available in variety of sizes

THE major steel plants of the country have proven the long life and accurate performance of Thomas Billet Shears to their own satisfaction. Furnished with or without feed tables.

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No. 2

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PITTSBURGH, PA.

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Flat—Triangular and Special Shapes

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Flat and Shaped Wires

JOHNSON STEEL & WIRE CO., INC.
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installation is of sturdy, simple design said to be capable of supporting several hundred pounds of anode material, which can be moved with little effort to any position desired.

In use the operator lowers the work to be plated into the tank, and then by means of the insulated handle, moves the anode rod to place the anodes in the most advantageous position for the parts being plated. When plating is completed, the rods are moved apart, the plated parts removed, new ones placed in the tank and the adjustment process repeated. It makes little difference whether one batch is similar to another, and the whole adjustment process takes much less time than was previously required. It is unnecessary during the operation to disconnect the rod from the source of power, and lifting of anode material by the operator is eliminated.

The company states that designs for this adjustable rod will be made available to interested manufacturers of plating equipment under license.

Mechanized Process Serves in Casting Aluminum

A special mechanized process for casting, machining and finishing aluminum sole plates for electric irons and electric steam irons is evidence that the creative ability of American production for war will carry over into the manufacture of civilian goods.

The new aluminum casting, according to Monarch Aluminum Mfg. Co., Cleveland, is not only of a fine quality and density of structure, but is ready for installation at a low price. The permanent mold method is used.

Standards Proposed for Electrical Contacts

Soon after the organization of subcommittee X, on Contact Materials, of American Society for Testing Materials Committee B-4 on Electrical Resistance Alloys, for developing standard tests for electrical contacts, it became evident that the problem was complicated by the variety of shapes and sizes of electrical contacts on the market. An investigation was made to determine the possibility of standardizing the shapes and sizes of the most commonly used electrical contacts. The shortage of materials also made this procedure important as a conservation measure. The proposal was favorably received by both manufacturers and users of contacts, and Section C on Standardization of Contact Forms and Sizes, of Subcommittee X, was organized.

This section, composed of representatives from the principal manufacturers and users of electrical contacts, has been working on this problem for the past four years, in co-operation with National Electrical Manufacturers' Association. Thus far standards have been completed

TEMPIL°

measures working temperatures

...QUICK

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A Tempil° pellet or a mark from pencil or liquid melts sharply at a given temperature at 25° to 50° intervals in the range from 125° to 1600° F. The method is simplicity itself and has a mean accuracy within 1%. Tempil° products come in three forms, pencil, pellet and liquid.

TEMPILSTIK° 125° F to 350° F in 25° steps. 400° F to 900° F in 50° steps.

For general use. Simply mark the surface of the work with the appropriate pencil. The mark liquifies sharply when the heated surface reaches the stated temperature.

TEMPIL PELLETS° 125° F to 350° F in 25° steps. 400° F to 1600° F in 50° steps.

Place on area to be heated. Pellet liquifies sharply when predetermined temperature is reached. Recommended where conditions of heating operation prevent close observation.

TEMPILAQ° 125° F to 350° F in 25° steps. 400° F to 1600° F in 50° steps.

Daubed on working surfaces, dries quickly, liquifies sharply at stated temperatures. For areas not conveniently accessible and for glazed and polished surfaces.

Write Gordon today for Tempil° Preheating Chart, Tempil° scale for weld bend testing, complete information on Tempil° products.

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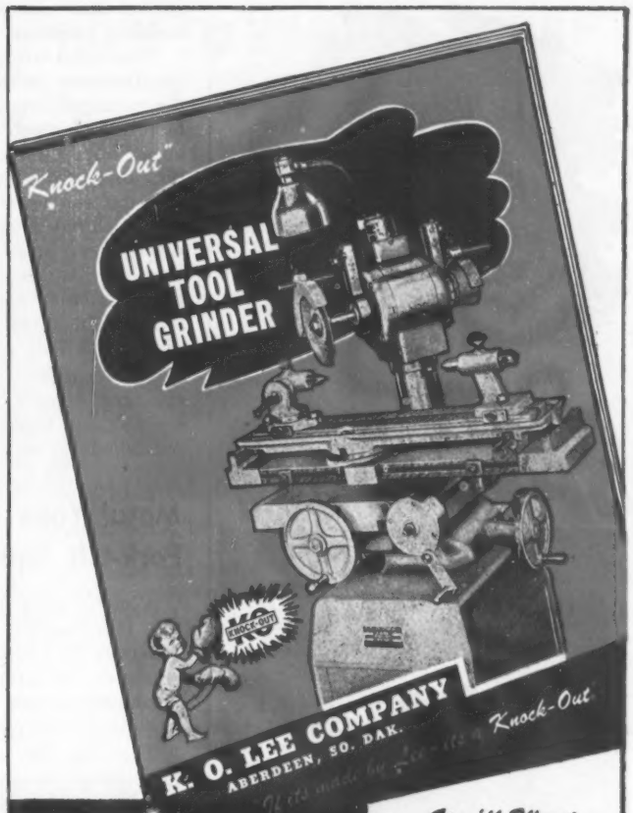

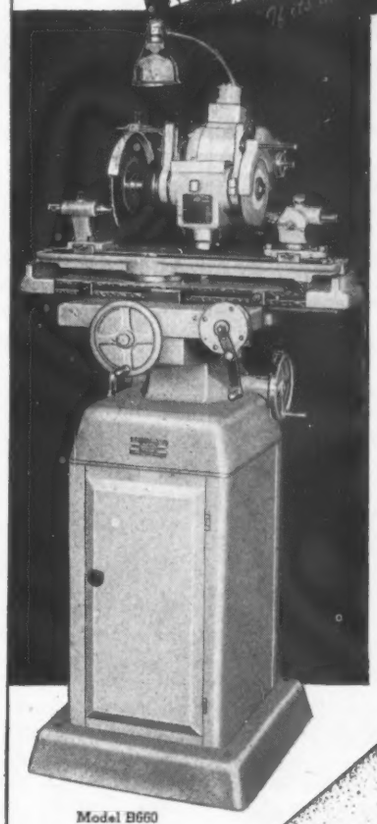

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Illustrative literature just off the press is now available for the asking. Fifty-two operating pictures, latest improvements in tool grinders. Many time saving grinding fixtures that are adaptable to any make tool grinder.

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UNIVERSAL TOOL GRINDER
NINE OPERATING SPEEDS
1,100 to 11,000 R.P.M.

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THE NEW SAW-GUN

SAWS and FILES in Hard-to-get-at Places

The Saw-Gun, illustrated above, will definitely speed up sawing and filing operations in your plant. Attach it to an electric drill, or propel it with compressed air or flexible shaft. Insert a hack saw blade in the holder and cut into metals of every description with astounding speed. Works equally well on plastics, wood and other materials. Ideal for panel notching and slotting operations. It's portable . . . carry it from job to job. For filing operations insert a file in special holder.

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It will pay you to get complete facts on this great tool. Better still . . . write your purchase order now and specify "money-back basis". But, by all means do it now . . . get this big time-saver working for you quickly.

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for contact rivets and for projection welding contacts.

These standards were developed by a questionnaire system, in which all of the principal users and all of the manufacturers of electrical contacts were given an opportunity to express themselves, both toward the matter of standardization and the suggested standard dimensions. Approval has been unanimous, and the results have been published for the first time. It is recommended that manufacturers and users of electrical contacts adopt these as their standards for production and for electrical design.

The committee now is working on standard dimensions for contact tipped screws and studs, and results will be published as soon as work is completed.

Metal Yoke Improvised for Fork-Lift Equipment

A metal yoke has been improvised at the Jeffersonville Quartermaster Depot, Jeffersonville, Ind. It enables fork-lift equipment to raise heavy or cumbersome machinery under which it is impossible to slide the prongs of a machine.

The yoke fits across the prongs and has welded into it a U-shaped ring. The fork-lift machine is run to the job, and the forks are raised to the desired height above it. The rope is fastened around the object to be moved and is run through the ring and tied. The prongs are then raised in the normal manner. This makes a sling or crane out of the machine; the object can be moved with ease or, if desired, a pallet can be slipped underneath. To prevent slipping of the metal yoke on the metal prongs, a leather strip is fastened to the yoke by means of wire.

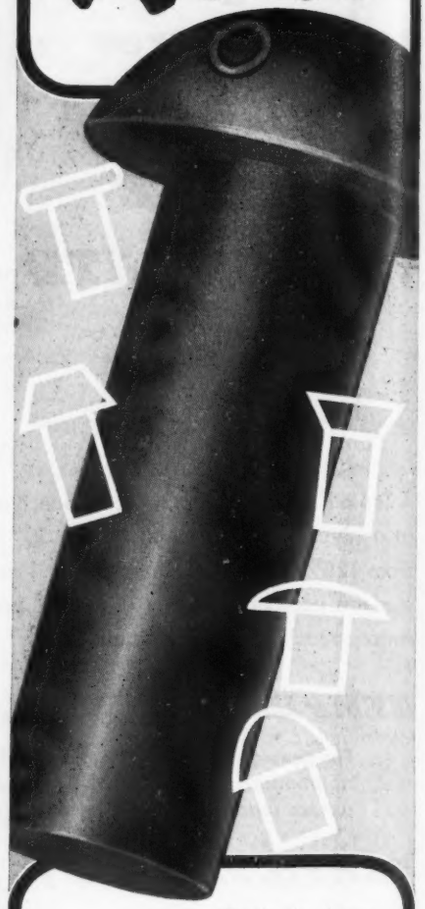
The yokes were made in the millwright shop at the depot. Separate units were designed for use on the 2000, 3000 and 5000-pound fork-lifts. Originator of the idea is Raymond C. Weir, employed in the Production and Maintenance Division of the depot.

Ion Exchange Resins Utilized in Filtration

Ordinary water can now be transformed into the chemical equipment of distilled water by a simple filtration process now available in portable and stationary equipment. With these units mineral-free water is made available for research in electronic and electrolytic equipment, in the manufacture of textiles, leather, paper, pharmaceuticals, food, dyestuffs, and in filling storage batteries.

The principle of this unit is filtration by utilization of melamine-derived and other resins. Water is passed through beds of these ion exchange resins, transforming dissolved salts in the water to the corresponding acids and in turn absorbing the acids. This process may be visualized by picturing water as containing flowing metals which are attracted by a magnet except that the magnet,

Oliver Rivets



Made in types, styles and sizes for all applications

The accurate size, uniform material and true-round shanks of Oliver rivets mean faster production of fabricated parts, firm grips, dependable joints.

To insure complete satisfaction in the rivets used in your operations, specify OLIVER!

OLIVER IRON AND STEEL Corporation
PITTSBURGH, PENNSYLVANIA
BOLTS . . . NUTS . . . RIVETS
STEEL FASTENERS

in this case, is chemical rather than electrical.

The final demineralized water has an average salts content as low as 2 parts per million as calcium carbonate, and has been produced as pure as ½ part per million. This process also removes dissolved carbon dioxide from the water, a feature of importance in the electronic and electrical fields. Water has been cleaned so effectively of its minerals that its resistance to an electric current is said to be increased to as much as 6,000,000 ohms, comparing with a resistance of 50,000 ohms, previously considered good.

Made by American Cyanamid & Chemical Corp., 30 Rockefeller Plaza, New York 20, in different sizes and capacities to meet various requirements, two types are available, one for field and the other for bench use. The field unit, designed for use by the armed forces, supplies demineralized water for storage batteries and for electronic equipment where water free of dissolved salts is essential to make it an insulating medium. The bench unit is designed for use in filling stations, drug stores, photographic studios, chemical laboratories, etc. The capacity of these small units is 8 to 10 gallons of demineralized water per hour. They are equipped with cartridges of ion exchange resins, renewable when exhausted in much the same way as flashlight batteries are renewed. An automatic shut-off or warning device indicates when renewal of the cartridge is necessary.

Permanent Unit Is Available

The Filt-R-Stil laboratory unit has a capacity of approximately 30 gallons per hour. Designed for the larger chemical and research laboratories, hospitals, and for other users where moderately large quantities of demineralized water are needed. It differs somewhat from the portable unit. In place of a cartridge, there are four beds of alternate cation and anion exchange resins in pyrex glass columns connected by an intricate piping system. As water passes over the first bed, dissolved salts are transformed to the corresponding acids. These acids are absorbed on the second bed. The third bed picks up any dissolved salts which have leaked through, and the fourth absorbs the remaining acids as well as removes the carbon dioxide.

These units also are made in special sizes for large industrial users—boiler plants, oil refineries, synthetic rubber plants, textile mills, etc., said to make possible a continuous supply of a thousand or more gallons of demineralized water and other liquids in production volume for improved process developments as, for instance, in the sugar and chemical industries.

Both the laboratory unit and the large, permanently installed units are equipped with a system for the reactivation of the ion exchange resins so that they may be used over and over again. These units also are equipped with electronic controls, operating on resistant circuit in

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Handle the load ONCE! KRANE KAR lifts, transports, and positions it. No need to maneuver the vehicle . . . swing the 'live' boom from side to side and raise or lower it, by power, with the full load on the magnet. For loading and unloading scrap at freight cars, handling bulky items around the yards, working at the scrap piles. Safe, fast, flexible, easy to operate. Write for Bulletin No. 58.

USERS: Carnegie-Illinois; Bethlehem; Republic; Consolidated; General Motors; American Smelting & Refining; Lima Locomotive Works; etc.

THE ORIGINAL SWING BOOM MOBILE CRANE WITH FRONT-WHEEL DRIVE AND REAR-WHEEL STEER

2½, 5, AND 10 TON CAPACITIES

KRANE KAR

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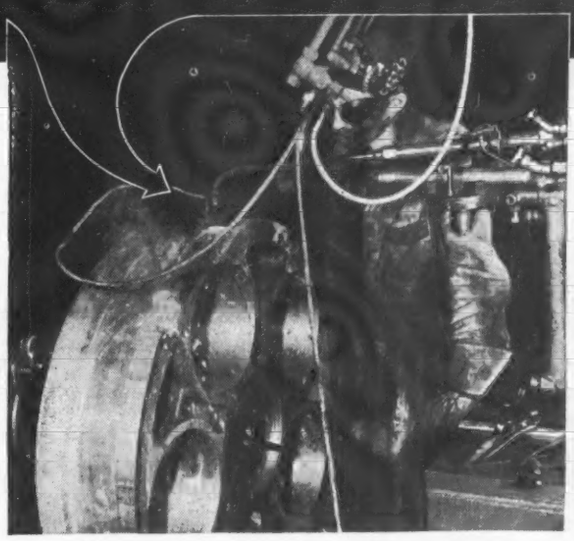
In a Spot Like This It's *Flame Hardening*



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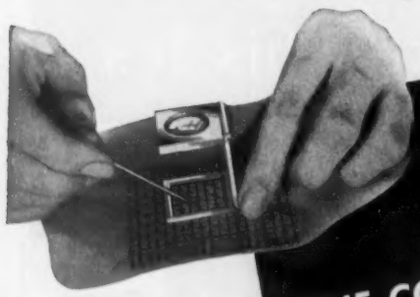
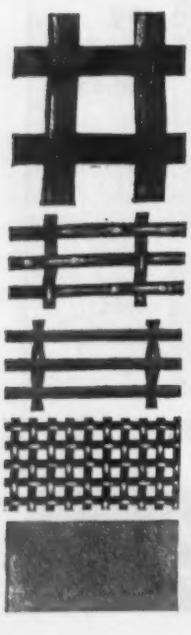


How to make certain that you're getting THE CORRECT WIRE CLOTH



There are too many mesh sizes, wire gauges, weaves and metals in use that are *nearly* right . . . and "nearly right" is often a long way from top efficiency and long life.

Wire cloth can and should be fabricated to meet requirements accurately and precisely. There are specific formulae for determining your needs for a particular operation or service. Likewise there are specific metals to resist conditions of wear, abrasion, corrosion and high temperature.

"Buffalo Wire" users are able to obtain not only such invaluable information, but more importantly to obtain their *exact wire cloth requirements*. The magnitude and variety of the "Buffalo Wire" line make this possible.

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MAILED WITHOUT CHARGE

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the water, which indicate when the effluent water is mineral-free or when the quality is below standard and regeneration is required.

"Live" Lathe Center Handles Heavy Loads

For handling heavy loads up to almost six tons, a "live" lathe center, No. 6MH, made by Ideal Commutator Dresser Co., 5076 Park, Sycamore, Ill., has a guaranteed tolerance of 0.0000 to 0.0005-inch. To handle radial loads up to 5750 pounds and thrust loads up to 8500 pounds, a bearing arrangement may be used. Two precision ball bearings in tandem support the spindle at the front, and two angular contact ball bearings preloaded support it at the rear of the housing. This arrangement is said to eliminate radial play and possible chatter. For protection of these bearings against entrance of chips, dust, coolant and other foreign matter, two sealing rings are used.

A design feature is the ease in redressing the point. The center is inserted in the lathe tailstock with retainer plug removed. A small steel rod is screwed into the threaded hole in the end of the spindle of the live center. By rotating the spindle point with this rod and by using a tool post grinder, accurate redressing of the points may be made.

This center is made with No. 6 Morse Taper only, and shipping weight is approximately 20 pounds. It supplements the regular line of Ideal live centers with Morse Tapers from No. 1 to No. 5.

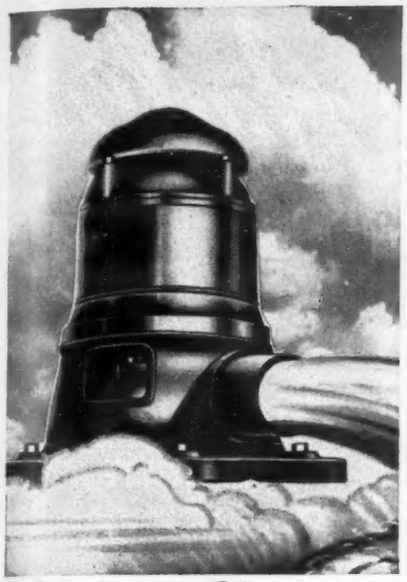
Cellular Glass Block Applications Are Varied

Cellular glass insulation in the form of rigid slabs 12 x 18 inches and in various thicknesses is a true glass blown up or cellulated so that its volume is about 15 times that of ordinary glass. It has a closed-cell structure, and there are about five million tiny sealed air pockets per cubic foot. It weighs 10 pounds per cubic foot, approximately the same as cork. Because it is light and impervious to water, it has found wartime use as the buoyant element in life rafts, net buoys and similar heavy flotation equipment. As insulation this product has been used in many types of ship construction.

Foamglas, made by Pittsburgh Corning Corp., 632 Duquesne Way, Pittsburgh, is unique in that it is unaffected by water in any form. This insures that thermal insulation provided by its light weight and cellular structure will not lose its effectiveness regardless of time and service conditions.

It is noncombustible and acts as a fire retardant when used in conjunction with other materials which are not fire-resistant. It is vermin and rodent proof and will not absorb or give off odors. These properties are of interest to food processing and storage plants.

This product is said to be unharmed by acid atmospheres or solutions attack-



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ing many materials. Hydrofluoric acid and hot caustic are the only chemicals which affect it adversely. In addition to its war tasks, it has served as thermal insulation in applications such as hot and cold tanks and towers, outdoor vats, furnaces, gas flues and ducts, drying kilns, process rooms, cold storage spaces, exterior built-up roofs, building floors and in cavity or core wall construction.

Installation on flat deck roofs is quite simple. On wood, precast concrete, gypsum slab or plank decks a layer of roofing paper or felt is applied. The insulating layer then is laid on this with staggered joints in a hot asphalt or pitch mopping. The finished built-up roofing plies then are laid over the glass, using the standard hot mopping procedure. On monolithic concrete or poured gypsum decks, no initial paper or felt layer is necessary.

In core walls this insulation may be used in combination with all types of masonry and concrete construction, with any type of tile or brick facing. Glass rigidity and strength prevent packing or settling, its inorganic nature prohibits deterioration, and its imperviousness to water and moisture insures permanently dry insulated walls.

For insulating industrial equipment and processing spaces, fibers may be applied by banding, wiring, and cementing according to practices in common use for other materials.

Research Initiated On Jet Propulsion Engines

The first jet propulsion engine wholly originated in this country is under development for the Bureau of Aeronautics, Navy Department, by Westinghouse Electric & Mfg. Co., East Pittsburgh, Pa. Probably more has been accomplished in the past two years to make the gas turbine widely practical than in all previous history. When completed, this new engine is expected to produce more pounds of thrust for a given amount of fuel and pounds of weight than any engines previously studied. It is expected to be important in future aircraft service.

Essentially, research work of three sorts is being done. Investigations are being made in the field of high-temperature metallurgy, because success of the combustion gas turbine cycle depends on the temperatures in the turbine itself being 1200 degrees Fahr. or more, which is well beyond the highest steam-turbine temperatures. The higher the permissible temperatures, the greater the efficiency and the wider the field of usefulness of the gas turbine cycle as a prime mover. Actual construction, the most active phase of this work, is found in designing, building and testing different units with variations as to size and arrangement. This includes designs for the three main components of a gas turbine cycle, axial-flow compressor, combustor, and gas turbine, and the relatively few but important controls and

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auxiliaries. Studies are being made on the possible uses of the combustion gas turbine cycle. It involves thermodynamic and heat-balance calculations for a variety of simple open-cycle systems, heat-recovery open-cycle systems, and closed-cycle systems all predicated on assumed efficiencies, loadings, and costs.

The attraction of the combustion gas turbine cycle lies in its simplicity and in its independence of a water supply. Basically it consists of three units on a single shaft. Liquid fuel is burned with an excess of air in a combustor. The hot products of combustion drive a gas turbine and, in the simple cycle, exhaust to atmosphere. The turbine is said to develop power to drive an axial-flow compressor on the same shaft supplying air to the combustor. Power from the turbine in excess of that required by the compressor may be utilized to drive a generator or some other mechanical load.

Efficiency of a 1200-degree Fahr. simple open-cycle gas turbine plant is about 20 per cent, or approximately two thirds that of a good steam or gasoline-engine power plant, according to the company. Also, all present combustors and turbines require liquid fuel, and the unit is not self-starting. However, it is simple in form, small in weight and bulk, requires no water, and is a rotating device. Efficiency is said to be increased 10 or 15 per cent by adding various heat-recovery devices such as inter-coolers for the compressor, regenerators for the combustor, and fuel reheaters. These add complications and some demand cooling water.

Open-cycle units with approximate maximum ratings of 7500 horsepower may be useful as emergency or stand-by generating units on power systems, particularly at the end of long lines or where good or adequate boiler water is lacking. To obtain larger amounts of power for central-station use from units of practical size, it may be necessary to use a closed-cycle system in which hot gases are continuously recirculated at higher pressure. Certain industrial applications, such as furnishing power for blast furnaces, seem promising. The gas turbine is stated to have potential usefulness in ship propulsion and for electric-drive locomotives, because of water economy.

Pellet Blast Cleans Engine Parts

A supplementary treatment for chemical processes now in use for removing carbon from aircraft, automotive and diesel engine pistons and other parts is said to speed and maintain mass overhaul schedules, as parts soaking time is reduced. While prolonged soaking in specialized chemicals is normally required to completely remove tenacious deposits, a comparatively short-time bath now suffices as Carboblast, manufactured by Turco Products Inc., Los Angeles, quickly removes residual carbon, oxides and gums. Pellets of ligno-cellulose employed in this process are said to be

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softer than metals used in engine construction and do not scratch or mar mirror-surfaces. As the pellets are essentially nonadherent as well as smooth and nonabrasive, it is unnecessary to mask off bearings, bronze bushings or plug, spark plug holes.

Narrow recesses, such as piston ring lands, cylinder fins, waffle underpiston structure, valve parts and screw threads, are stated to be penetrated and cleaned by these various size pellets. The company claims this process works about as fast as the operator can place parts in the stream of pellets.

Pellets are durable and may be used repeatedly at low cost. Conventional sandblasting equipment is adaptable to this process. A specially designed cabinet with two ports, a glass window at eye level and a funnel-shaped hopper holding about 50 pounds of the ligno-cellulose pellets also is offered by the company.

Booklet Describes Role of Communications in War

A 40-page booklet entitled "Circuits for Victory" depicting the important role of communications weapons in modern warfare has been published by Western Electric Co., 195 Broadway, New York 7. This company is in peacetime the source of supply for the Bell System and now is an important maker of electronic and communications devices for the armed forces.

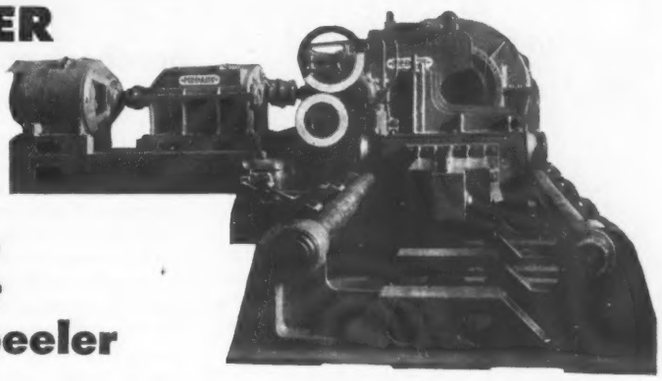
Using the pictorial technique, this booklet projects the success of modern communications equipment in war in the design and manufacture of telephone and communications facilities. It shows how progressive improvement in designs and methods has advanced the telephone and radio from a neighborhood curiosity to a world-wide network of voice channels, how those communications devices and others today are helping to spark the attack on all battle fronts.

The book also features a chart in four colors revealing in highly simplified form the interrelation of military and naval communications units. It shows the spider-web of telephone, teletype and radio links running from the battlefront to the center of co-ordination in the Navy Department or the Pentagon building in Washington.

Standardized Cutters Simplify Ordering

A new line of standardized thread milling cutters by Detroit Tap & Tool Co., Detroit, offers the advantages of faster delivery, elimination of special designs, and simplified ordering from stock. The only ordering requirements are the "blank number" desired, thread specifications, and the general class of thread milling operation involved. There are 72 different types and sizes of shell and shank type thread milling cutter blanks, ranging in size from ¾-inch to 3½ inches diameter.

HYDRAULIC POWER



for the largest billet peeler

This Medart rotary cutter billet peeler will turn the outside of rolled or forged bars up to 13 inches diameter, and is the largest machine of its type in the world.

Two hydraulic grip carriages on input and output sides clamp the billet. The carriage is moved forward by a large hydraulic cylinder.

Hannifin precision hydraulic cylinders are used by Medart for both these applications. The carriage cylinders are 11 inch bore x 144 inch stroke, an example of Hannifin ability to build large, long stroke cylinders to precision standards. All Hannifin hydraulic cylinders, large or small, are bored and honed to produce a mirror-finish cylinder body—for maximum power, smooth action, and long life.

Write for Bulletin 35 describing Hannifin hydraulic cylinders, Hannifin Manufacturing Company, 621-631 South Kolmar Avenue, Chicago 24, Illinois.

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Book Notes

Arc Welding Production Engineering and Control

Arc Welding Engineering and Production Control, by Walter J. Brooking; cloth, 347 pages 5¼ x 8¼ inches; published by McGraw-Hill Book Co. Inc., New York, for $4.

Wide acceptance of arc welding for manufacturing modern structures and equipment and widespread conversion to arc-welded fabrication are evidence that the process is economically sound. Much research and highly technical development on the one hand and a great amassing of shop practice and know-how by individual operators on the other have created a great store of information. A problem of the industry has been to organize and pass on to new key employes a workable knowledge of the shop skill, shop control and shop know-how relating arc welding to the fundamentals of modern mass production and scheduling, without the new key employe having to go through years of actual experience.

This text, dealing with control of arc welded production, is intended to serve as a link between this elementary literature and the highly technical reports of developmental research, that those newly associated with the industry may obtain a working knowledge of the field quickly and easily.

Handbook on Cast Metals Revised to Latest Data

Cast Metals Handbook, third revision, 1944; cloth, 745 pages, 6 x 9 inches; 258 illustrations, 204 tables; published by American Foundrymen's Association, 222 West Adams street, Chicago, for $6.

This issue of the handbook represents an extensive revision from the 1940 edition. It deals exclusively with the engineering properties of cast metals, prepared especially for use by those who design metal parts or who specify or purchase cast metals for industrial products.

It includes considerable information for designers of castings, showing specific structures where redesigning has improved the product. Included are recommendations to castings buyers to answer many problems. A section is devoted to the significance of strength and ductility tests of metals, covering resistance to fracture, creep strength, hardness, static and dynamic ductility, corrosion fatigue and wear.

Extensive separate sections deal with steel, malleable iron, cast iron and nonferrous alloys, all technical data being brought up to date in view of developments since the prior edition. The volume is intended for long-range use rather than simply to cover specifications made necessary by wartime shortages and restrictions. Conforming specifications are shown both from ferrous and nonferrous products, including A.S.T.M., federal, Navy, S.A.E., A.M.S., and Bureau of Ships.

Extensive bibliographies are included for each of the various cast metals sections, with many references to American and foreign foundry practices.

Commercial Laws and Credit Information

Credit Manual of Commercial Laws, 1945 edition, cloth, 789 pages, 6 x 9 inches; published by National Association of Credit Men, 1 Park avenue, New York 16, for $6.50.

This is a further issue of this manual brought up to the first of this year, designed to provide accurate and authoritative information in regard to the subject matter covered. However, the association sells it with the understanding that it is not engaged in rendering legal, accounting or other professional service.

In it the association has endeavored to set forth fundamental legal principles and existing statutes in order that credit and business executives may have a convenient guide. Readers are warned that frequent changes are made by government agencies and that care should be taken at intervals to check on the regulations in force. This refers especially to the chapter on contract termination.

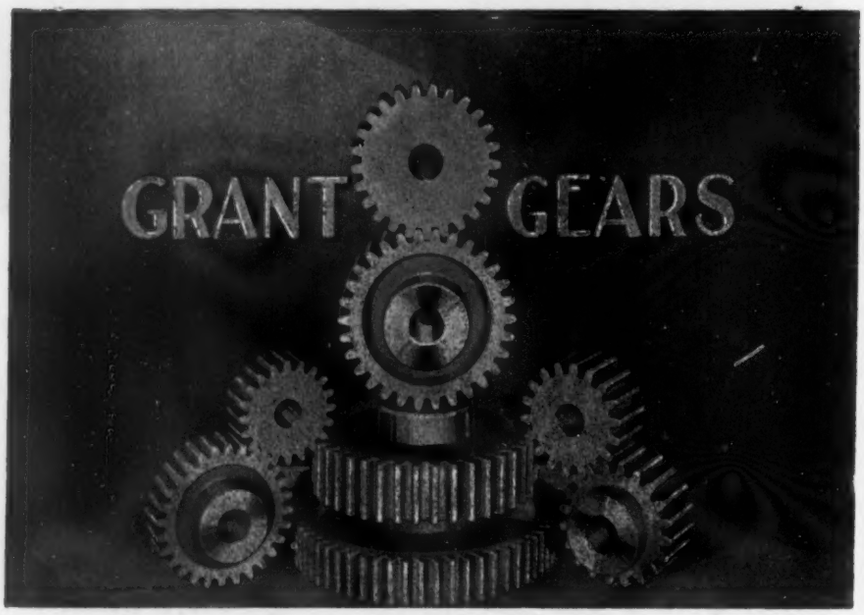
Main subjects covered are: Basic law of business; secured credits; legal phases of collections; insolvency; federal regulations. Under each main head the subject is divided into various phases and each is exhaustively discussed. An adequate index makes search for a subject easy.

Self-Instruction for Sheet Metal Workers

Sheet Metal, Theory and Practice, by John C. Butler; cloth, 173 pages, 8½ x 11 inches; published by John Wiley & Sons Inc., New York, for $3.

This volume for sheet metal workers is a concise, practical, tested self-instruction guide, giving methods of handling tools and machines, material allowances, blueprint reading, soldering, fluxes, welded and riveted assemblies, as used in current sheet metal shop practice.

This volume is the result of a condensed training program in sheet metal work devised to provide trained workers to meet demands of the expanded shipbuilding program in the war effort. Success of the training plan was such that sufficient workers were trained to meet schedules of delivery. The author then determined to make the course of



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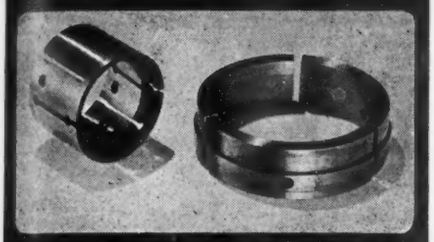

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training available in the present volume. While prepared primarily for production of marine sheet metal work it is applicable as well to all branches of the craft.

Folder Describes Clinch-Lock Nuts

An illustrated folder describing clinch-lock nuts for increasing thread area in sheet metal shows that Fast-On lock nuts, developed by FabriSteel Products Inc., 642 Beaubien, Detroit, make practical the use of lighter gage stock and simplify assembly in inaccessible places.

When installed, the resulting round upset section of the nut is said to provide a smooth flat surface, making practical the drawing together of two metal parts flush and tight.

They are now being used in assembly of the modern all steel automotive and electric refrigerator units, but may be used to assemble almost all sheet metal parts. They weigh about the same as standard nuts.

These nuts are made from a cold drawn, flanged section and held to close tolerances. Various methods of installation are employed, depending on production requirements, ranging from hand swaging to the use of automatic machine equipment.

Process Prepares Aluminum for Electroplating

A new process for preparing aluminum for electroplating the Alumon process, patented by Enthone Co., 525 Elm, New Haven, Conn., permits electroplating of all types of aluminum, including rack and bulk work. Procedure consists of cleaning in the usual manner, followed by a short dip in the special solution, which produces an active alloy that subsequently can be copper or silver plated. After the work has been given a light copper plate, it can be electroplated with other metals including nickel, chromium, gold, etc.

This process is being used for plating aluminum radar equipment and other apparatus. Work plated by this method can be subjected to severe distortion without flaking and the plate can be readily soldered, permitting easy soldering to parts made of aluminum. Interest has developed in use of the process for postwar plating of such articles as costume jewelry, amulets, pencil points, etc.

—o—

A reprint entitled "Water Deaeration Halts Corrosion of Equipment" describes the application and general design of cold water deaerators to prevent corrosion of pipelines, heat exchange equipment, etc. According to Cochrane Corp., Seventeenth and Allegheny, Philadelphia 32, this device will have wide application in industrial plants, utilizing large quantities of cooling water.

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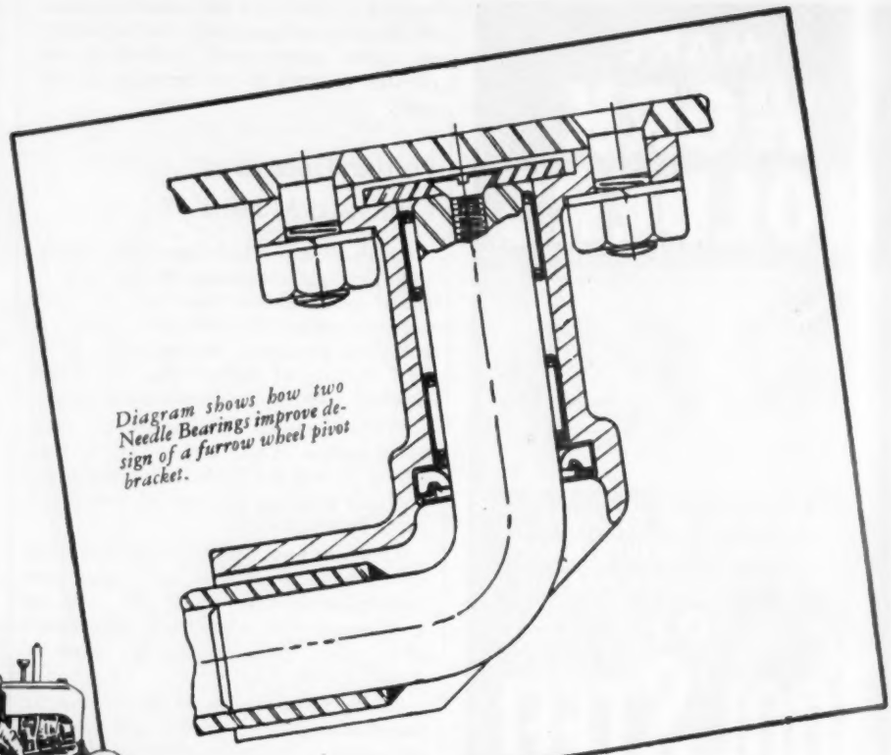

Diagram shows how two Needle Bearings improve design of a furrow wheel pivot bracket.

Anti-friction Needle Bearings Add to Service Life of Tractor Plows

The wheel pivot on a tractor plow must be designed to operate *freely* yet to stand the stress and strain of rough, rugged use with a minimum of attention to maintenance.

That's why this application of Torrington Needle Bearings so well demonstrates the advantages these modern, high capacity anti-friction bearings bring to the design of many farm machinery equipment parts. Check the accompanying cross-section and note how the two Needle Bearings are fitted into a simple housing design to provide lifelong anti-friction efficiency at comparatively low cost.

Add to this the space and weight-saving designs Needle Bearings make possible; the efficient lubrication their use permits; their ease of handling and installation; their long service life—and you have convincing reasons why their use has become increasingly popular with all leading manufacturers of farm machinery and implements.

Look for these Torrington Needle Bearing advantages when you select new equipment! For additional information on the wide range of types and sizes available, send for the Needle Bearing Catalog No. 30-A.

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Higher Steel Prices Near; Production Falls Sharply

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HIGHER prices on some carbon steel products may be approved by Office of Price Administration within the next few weeks, based on the fact that steelmaking costs have risen since prices were frozen, some probably effective before the end of February.

General Steel Products Advisory Committee will confer with OPA officials within a few days, when results of the latest survey of steelmaking costs will be discussed. At that time the committee will have opportunity to make application for increases in steel prices, in addition to the recent interim increases of $2 to $5 per ton on several products.

A study is being made to determine what relief steel warehouses may need in passing the higher prices on to consumers. Similar action is being taken with advisory committees of such fabricators as bolt and nut and steel drum manufacturers, cold-drawn bar and cold-rolled sheet producers, who will need relief when higher mill prices of their raw materials are allowed.

Steel orders in January were perhaps the heaviest on record and deliveries are extending rapidly, with adverse factors of weather and labor shortage important factors in the latter. Some producers have been forced to reduce production to the lowest level of the war years. Prospects for early improvement are not bright as further railroad embargoes are thought likely. Threat of a miners' strike is a further factor in considering future conditions.

Extension of deliveries is not only impressive in major products, carbon bars and hot and cold-rolled sheets, but in various specialties also, with a general stiffening all along the line.

Scrap supply is much less than needs, preparation and shipments being delayed by bad weather, and allocations of railroad and industrial material being resorted to in many cases. Proposal to establish a zoning system for scrap, limiting purchases to an area close to the consumer has been under consideration, in an effort to reduce cross-hauling. Difficulties are seen in its application, various consuming districts having been accustomed to bring scrap from a distance in absence of sufficient supply near their mills.

In spite of enlarged production at a number of centers the steelmaking rate last week declined 2½ points to 91 per cent of capacity as weather and other factors cut operations deeply at some points. Chicago advanced 2 points to 99½ per cent, Pittsburgh 1½ points to 87½, Wheeling 5 points to 97½, Cincinnati 3 points to 95, New England 2 points to 94 and Birmingham 5 points to 95. Buffalo production was cut to about half the prior week, declining 38½ points to 43 per cent, touching a low of 23 per cent one day. Youngstown dropped 5 points to 80, eastern Pennsylvania 1 point to 93, Cleveland 7 points to 79½ per cent and Detroit 3 points to 87. St. Louis at 75 per cent was unchanged.

Broadening shell and small arms ammunition requirements are making good the forecast of several weeks ago and bar needs continue to grow. Deliveries on large diameters fall in third quarter, directives being needed for earlier delivery. Some makers can book hot-rolled sheets in July, with most quoting August and September and cold-rolled for August to October.

Some effect of limitation of pig iron inventory to 30 days may be noticed in specifying for February and March but this is not expected to be important, as many melters have not carried heavy stocks. Better shipments from the Buffalo district have eased the situation for some eastern foundries. Some had been forced to curtail or suspend production. Better car supply is moving iron from furnace stocks in that area. Shortage of labor continues a deterrent.

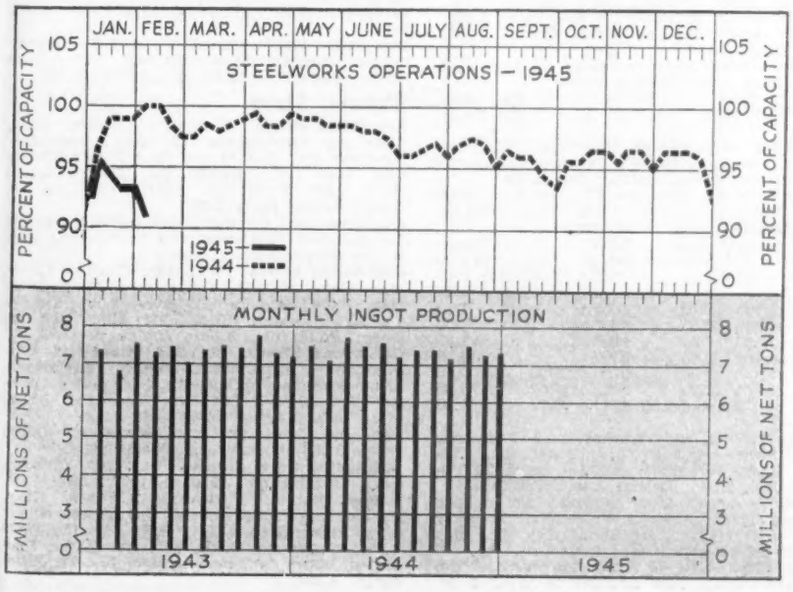
With ceiling prices prevailing on all products average composite prices of steel and iron products are unchanged, finished steel at $57.55, semifinished steel $36, steelmaking pig iron $23.05 and steelmaking scrap $19.17.

DISTRICT STEEL RATES

Percentage of Ingot Capacity Engaged in Leading Districts

	Week Ended Feb. 3	Change	Same Week 1944	Same Week 1943
Pittsburgh	87.5	+1.5	100	97.5
Chicago	99.5	+2	102.5	100
Eastern Pa.	93	—1	94	94
Youngstown	80	—5	96	97
Wheeling	97.5	+5	102	79.5
Cleveland	79.5	—7	92	91.5
Buffalo	43	—38.5	88.5	90.5
Birmingham	95	+5	95	100
New England	94	+2	95	95
Cincinnati	95	+3	84	95
St. Louis	75	None	83	93
Detroit	87	—3	91	93
Estimated national rate	91	—2.5*	100	*98.5

*Based on steelmaking capacities as of these dates.



COMPOSITE MARKET AVERAGES

	Feb. 3	Jan. 27	Jan. 20	One Month Ago Jan., 1945	Three Months Ago Nov., 1944	One Year Ago Feb., 1944	Five Years Ago Feb., 1940
Finished Steel	$57.55	$57.55	$57.55	$57.22	$56.73	$56.73	$56.73
Semifinished Steel	36.00	36.00	36.00	36.00	36.00	36.00	36.00
Steelmaking Pig Iron	23.05	23.05	23.05	23.05	23.05	23.05	22.05
Steelmaking Scrap	19.17	19.17	19.17	19.17	19.17	19.17	17.10

Finished Steel Composite:—Average of industry-wide prices on sheets, strips, bars, plates, shapes, wire nails, tin plate, standard and line pipe. Semifinished Steel Composite:—Average of industry-wide prices on billets, slabs, sheet bars, skelp and wire rods. Steelmaking Pig Iron Composite:—Average of basic pig iron prices at Bethlehem, Birmingham, Buffalo, Chicago, Cleveland, Neville Island, Granite City and Youngstown. Steelworks Scrap Composite:—Average of No. 1 heavy melting steel prices at Pittsburgh, Chicago and eastern Pennsylvania. Finished steel, net tons; others, gross tons.

COMPARISON OF PRICES

Representative Market Figures for Current Week; Average for Last Month, Three Months and One Year Ago

Finished Material

	Feb. 3, 1945	Dec., 1944	Oct., 1944	Jan., 1944
Steel bars, Pittsburgh	2.15c	2.15c	2.15c	2.15c
Steel bars, Chicago	2.15	2.15	2.15	2.15
Steel bars, Philadelphia	2.47	2.47	2.47	2.47
Shapes, Pittsburgh	2.10	2.10	2.10	2.10
Shapes, Philadelphia	2.215	2.215	2.215	2.215
Shapes, Chicago	2.10	2.10	2.10	2.10
Plates, Pittsburgh	2.20	2.15	2.10	2.10
Plates, Philadelphia	2.25	2.225	2.15	2.15
Plates, Chicago	2.20	2.15	2.10	2.10
Sheets, hot-rolled, Pittsburgh	2.20	2.15	2.10	2.10
Sheets, cold-rolled, Pittsburgh	3.05	3.05	3.05	3.05
Sheets, No. 24 galv., Pittsburgh	3.65	3.60	3.50	3.50
Sheets, hot-rolled, Gary	2.20	2.15	2.10	2.10
Sheets, cold-rolled, Gary	3.05	3.05	3.05	3.05
Sheets, No. 24 galv., Gary	3.65	3.60	3.50	3.50
Bright bess., basic wire, Pittsburgh	2.60	2.60	2.60	2.60
Tin plate, per base box, Pittsburgh	$5.00	$5.00	$5.00	$5.00
Wire nails, Pittsburgh	2.80	2.70	2.55	2.55

Semifinished Material

Sheet bars, Pittsburgh, Chicago	$34.00	$34.00	$34.00	$34.00
Slabs, Pittsburgh, Chicago	34.00	34.00	34.00	34.00
Rerolling billets, Pittsburgh	34.00	34.00	34.00	34.00
Wire rods, No. 5 to $\frac{9}{32}$-inch, Pitts.	2.00	2.00	2.00	2.00

Pig Iron

	Feb. 3, 1945	Dec., 1944	Oct., 1944	Jan., 1944
Bessemer, del. Pittsburgh	$25.19	$25.19	$25.19	$25.19
Basic, Valley	23.50	23.50	23.50	23.50
Basic, eastern del. Philadelphia	25.34	25.34	25.34	25.34
No. 2 fdry., del. Pitts., N.&S. Sides	24.69	24.69	24.69	24.69
No. 2 foundry, Chicago	24.00	24.00	24.00	24.00
Southern No. 2, Birmingham	20.38	20.38	20.38	20.38
Southern No. 2 del. Cincinnati	24.30	24.30	24.30	24.30
No. 2 fdry., del. Phila.	25.84	25.84	25.84	25.84
Malleable, Valley	24.00	24.00	24.00	24.00
Malleable, Chicago	24.00	24.00	24.00	24.00
Lake Sup., charcoal, del. Chicago	37.34	37.34	37.34	37.34
Gray forge, del. Pittsburgh	24.19	24.19	24.19	24.19
Ferromanganese, del. Pittsburgh	140.33	140.33	140.33	140.33

Scrap

Heavy melting steel, No. 1 Pittsburgh	$20.00	$20.00	$17.15	$20.00
Heavy melt. steel, No. 2, E. Pa.	18.75	18.75	15.50	18.75
Heavy melting steel, Chicago	18.75	18.75	16.70	18.75
Rails for rolling, Chicago	22.25	22.25	22.25	22.25
No. 1 cast, Chicago	20.00	20.00	20.00	20.00

Coke

Connellsville, furnace, ovens	$7.00	$7.00	$7.00	$7.00
Connellsville, foundry ovens	7.75	7.75	7.75	7.75
Chicago, by-product fdry., del.	13.35	13.35	13.35	13.35

STEEL, IRON RAW MATERIAL, FUEL AND METALS PRICES

Following are maximum prices established by OPA Schedule No. 6 issued April 16, 1941, revised June 20, 1941 and Feb. 4, 1942. The schedule covers all iron or steel ingots, all semifinished iron or steel products, all finished hot-rolled, cold-rolled iron or steel products and any iron or steel product which is further finished by galvanizing, plating, coating, drawing, extruding, etc., although only principal established basing points for selected products are named specifically. Seconds and off-grade products are also covered. Exceptions applying to individual companies are noted in the table.

Semifinished Steel

Gross ton basis except wire rods, skelp.

Carbon Steel Ingots: F.o.b. mill base, rerolling qual., stand. analysis, $31.00.

(Empire Sheet & Tin Plate Co., Mansfield, O., may quote carbon steel ingots at $33 gross ton, f.o.b. mill. Kaiser Co. Inc. $43, f.o.b. Pacific ports.)

Alloy Steel Ingots: Pittsburgh, Chicago, Buffalo, Bethlehem, Canton, Massillon; uncrop., $45.

Rerolling Billets, Blooms, Slabs: Pittsburgh, Chicago, Gary, Cleveland, Buffalo, Sparrows Point, Birmingham, Youngstown, $34; Detroit, del. $36; Duluth (bil) $36; Pac. Ports, (bil) $46. (Andrews Steel Co., carbon slabs $41; Continental Steel Corp., billets $34, Kokomo, to Acme Steel Co.; Northwestern Steel & Wire Co., $41, Sterling, Ill.; Laclede Steel Co. $34, Alton or Madison, Ill.; Wheeling Steel Corp. $36 base, billets for lend-lease, $34, Portsmouth, O., on slabs on WPB directives. Granite City Steel Co. $47.50 gross ton slabs from D.P.C. mill. Geneva Steel Co., Kaiser Co. Inc., $58.64, Pac. Ports).

Forging Quality Blooms, Slabs, Billets: Pittsburgh, Chicago, Gary, Cleveland, Buffalo, Birmingham, Youngstown, $40. Detroit, del. $42; Duluth, billets, $42; forg. bil. f.o.b. Pac. Ports, $52.

(Andrews Steel Co. may quote carbon forging billets $50 gross ton at established basing points; Follansbee Steel Corp., $49.50 f.o.b. Toronto, O. Geneva Steel Co., Kaiser Co. Inc., $64.64, Pacific ports.)

Open Hearth Shell Steel: Pittsburgh, Chicago, Gary, Cleveland, Buffalo, Youngstown, Birmingham, base 1000 tons one size and section; 3-12 in., $52; 12-18 in., excl., $54.00; 18 in. and over $56. Add $2.00 del. Detroit; $3.00 del. Eastern Mich. (Kaiser Co. Inc., $76.64, f.o.b. Los Angeles.)

Alloy Billets, Slabs, Blooms: Pittsburgh, Chicago, Buffalo, Bethlehem, Canton, Massillon, $54; del. Detroit $56, Eastern Mich. $57.

Sheet Bars: Pittsburgh, Chicago, Cleveland, Buffalo, Canton, Sparrows Point, Youngstown, $34. (Wheeling Steel Corp. $37 on lend-lease sheet bars, $38 Portsmouth, O., on WPB directives; Empire Sheet & Tin Plate Co., Mansfield, O., carbon sheet bars, $39, f.o.b. mill.)

Skelp: Pittsburgh, Chicago, Sparrows Point, Youngstown, Coatesville, lb., 1.90c.

Wire Rods: Pittsburgh, Chicago, Cleveland, Birmingham, No. 5—$\frac{9}{32}$ in. inclusive, per 100 lbs., $2. Do., over $\frac{9}{32}$—$\frac{47}{64}$-in., incl., $2.15; Galveston, base, 2.25c and 2.40c, respectively. Worcester add $0.10; Pacific Ports $0.50. (Pittsburgh Steel Co., $0.20 higher.)

Bars

Hot-Rolled Carbon Bars and Bar-Size Shapes under 3": Pittsburgh, Chicago, Gary, Cleveland, Buffalo, Birmingham, base 20 tons one size, 2.15c; Duluth, base 2.25c; Mahoning Valley 2.22½c; Detroit, del. 2.25c; Eastern Mich. 2.30c; New York del. 2.49c; Phila. del. 2.47c; Gulf Ports, dock 2.52c; Pac. ports, dock 2.80c. (Calumet Steel Division, Borg Warner Corp., and Joslyn Mfg. & Supply Co. may quote 2.35c, Chicago base; Sheffield Steel Corp., 2.75c, f.o.b. St. Louis.)

Rail Steel Bars: Same prices as for hot-rolled carbon bars except base is 5 tons.

(Sweet's Steel Co., Williamsport, Pa., may quote rail steel merchant bars 2.33c f.o.b. mill.)

Hot-Rolled Alloy Bars: Pittsburgh, Chicago, Canton, Massillon, Buffalo, Bethlehem, base 20 tons one size, 2.70c; Detroit, del., 2.80c.

(Texas Steel Co. may use Chicago base price as maximum f.o.b. Fort Worth, Tex., price on sales outside Texas, Oklahoma.)

AISI Series	(*Basic O-H)	AISI Series	(*Basic O-H)
1300	$0.10	4100 (.15-.25 Mo)	0.70
		(.20-.30 Mo)	0.75
2300	1.70	4300	1.70
2500	2.55	4600	1.20
3000	0.50	4800	2.15
3100	0.85	5100	0.35
3200	1.35	5130 or 5152	0.45
3400	3.20	6120 or 6152	0.95
4000	0.45-0.55	6145 or 6150	1.20

*Add 0.25 for acid open-hearth; 0.50 electric.

Cold-Finished Carbon Bars: Pittsburgh, Chicago, Gary, Cleveland, Buffalo, base 20,000-39,999 lbs., 2.65c; Detroit 2.70c; Toledo 2.80c. (Keystone Drawn Steel Co. may sell outside its usual market area on Proc. Div., Treasury Dept. contracts at 2.65c, Spring City, Pa., plus freight on hot-rolled bars from Pittsburgh to Spring City. New England Drawn Steel Co. may sell outside New England on WPB directives at 2.65c, Mansfield, Mass., plus freight on hot-rolled bars from Buffalo to Mansfield.)

Cold-Finished Alloy Bars: Pittsburgh, Chicago, Gary, Cleveland, Buffalo, base 3.35c; Detroit, del. 3.45c; Eastern Mich. 3.50c.

Reinforcing Bars (New Billet): Pittsburgh, Chicago, Gary, Cleveland, Birmingham, Sparrows Point, Buffalo, Youngstown, base 2.15c; Detroit del. 2.25c; Eastern Mich. and Toledo 2.30c; Gulf ports, dock 2.50c; Pacific ports, dock 2.55c.

Reinforcing Bars (Rail Steel): Pittsburgh, Chicago, Gary, Cleveland, Birmingham, Youngstown, Buffalo base 2.15c; Detroit, del. 2.25c; Eastern Mich. and Toledo 2.30c; Gulf ports, dock 2.50c.

(Sweet's Steel Co., Williamsport, Pa., may quote rail steel reinforcing bars 2.33c, f.o.b. mill.)

Iron Bars: Single refined, Pitts. 4.40c; double refined 5.40c; Pittsburgh, staybolt, 5.75c; Terre Haute, single ref., 5.00c, double ref., 6.25c.

Sheets, Strip

Hot-Rolled Sheets: Pittsburgh, Chicago, Gary, Cleveland, Birmingham, Buffalo, Youngstown, Sparrows Pt., Middletown, base 2.20c; Granite City, base 2.30c; Detroit del. 2.30c; Eastern Mich. 2.35c; Phila. del. 2.37c; New York del. 2.44c; Pacific ports 2.75c.

(Andrews Steel Co. may quote hot-rolled sheets for shipment to Detroit and the Detroit area on the Middletown, O. base.)

Cold-Rolled Sheets: Pittsburgh, Chicago, Cleveland, Gary, Buffalo, Youngstown, Middletown, base, 3.05c; Granite City, base 3.15c; Detroit del. 3.15c; Eastern Mich. 3.20c; New York del. 3.39c; Phila. del. 3.37c; Pacific ports 3.70c.

Galvanized Sheets, No. 24: Pittsburgh, Chicago, Gary, Birmingham, Buffalo, Youngstown, Sparrows Point, Middletown, base 3.65c; Granite City, base 3.75c; New York del. 3.89c; Phila. del. 3.82c; Pacific ports 4.20c.

(Andrews Steel Co. may quote galvanized sheets 3.75c at established basing points.)

Corrugated Galv. Sheets: Pittsburgh, Chicago, Gary, Birmingham, 29 gage, per square 3.31c.

Culvert Sheets: Pittsburgh, Chicago, Gary, Birmingham, 16 gage, not corrugated, copper alloy 3.60c; Granite City 3.70c; Pacific Ports 4.25c; copper iron 3.90c, pure iron 3.95c; zinc-coated, hot-dipped, heat-treated, No. 24, Pittsburgh, 4.25c.

Enameling Sheets: 10-gage; Pittsburgh, Chicago, Gary, Cleveland, Youngstown, Middletown, base, 2.75c; Granite City, base 2.85c; Detroit, del. 2.85c; eastern, Mich. 2.90c; Pacific ports 3.40c; **20-gage;** Pittsburgh, Chicago, Gary, Cleveland, Youngstown, Middletown, base 3.35c; Detroit del. 3.45c; eastern Mich. 3.50c; Pacific ports 4.00c.

Electrical Sheets No. 24:

	Pittsburgh Base	Pacific Ports	Granite City
Field grade	3.20c	3.95c	3.30c
Armature	3.55c	4.30c	3.65c
Electrical	4.05c	4.80c	4.15c
Motor	4.95c	5.70c	5.05c
Dynamo	5.65c	6.40c	5.75c
Transformer			
72	6.15c	6.90c	.....
65	7.15c	7.90c	.....
58	7.65c	8.40c	.....
52	8.45c	9.20c	.....

Hot-Rolled Strip: Pittsburgh, Chicago, Gary, Cleveland, Birmingham, Youngstown, Middletown, base 1 ton and over, 12 inches wide and less 2.10c; Detroit del. 2.20c; Eastern Mich. 2.25c; Pacific ports 2.75c. (Joslyn Mfg. Co. may quote 2.30c, Chicago base.)

Cold Rolled Strip: Pittsburgh, Cleveland, Youngstown, 0.25 carbon and less 2.80c; Chicago, base 2.90c; Detroit, del. 2.90c; Eastern Mich. 2.95c; Worcester base 3.00c.

Commodity C. R. Strip: Pittsburgh, Cleveland, Youngstown, base 3 tons and over, 2.95c; Chicago 3.05c; Detroit del. 3.05c; Eastern Mich. 3.10c; Worcester base 3.35c.

Cold-Finished Spring Steel: Pittsburgh, Cleveland bases, add 20c for Worcester; .26-.50 Carb., 2.80c; .51-.75 Carb., 4.30c; .76-1.00 Carb., 6.15c; over 1.00 Carb., 8.35c.

Tin, Terne Plate

Tin Plate: Pittsburgh, Chicago, Gary, 100-lb. base box, $5.00; Granite City $5.10.

Electrolytic Tin Plate: Pittsburgh, Gary, 100-lb. base box, 0.50 lb. tin, $4.50; 0.75 lb. tin $4.65.

Tin Mill Black Plate: Pittsburgh, Chicago, Gary, base 29 gage and lighter, 3.05c; Granite City, 3.15c; Pacific ports, boxed 4.05c.

Long Ternes: Pittsburgh, Chicago, Gary, No. 24 unassorted 3.80c; Pacific ports 4.55c.

Manufacturing Ternes: (Special Coated) Pittsburgh, Chicago, Gary, 100-base box $4.30; Granite City $4.40.

Roofing Ternes: Pittsburgh base per package 112 sheets; 20 x 28 in., coating I.C. 8-lb. $12.00; 15-lb. $14.00; 20-lb. $15.00; 25-lb. $16; 30-lb. $17.25; 40-lb. $19.50.

Plates

Carbon Steel Plates: Pittsburgh, Chicago, Gary, Cleveland, Birmingham, Youngstown, Sparrows Point, Coatesville, Claymont, 2.20c; New York, del. 2.39c; Phila., del. 2.25c; St. Louis, 2.44c; Boston, del. 2.52-77c; Pacific ports, 2.75c; Gulf ports, 2.55c.

(Granite City Steel Co. may quote carbon plates 2.35c f.o.b. mill; 2.65c f.o.b. D.P.C. mill; Kaiser Co. Inc., 3.20c, f.o.b. Los Angeles. Central Iron & Steel Co. 2.50c f.o.b. basing points; Geneva Steel Co., Provo, Utah, 3.20c, f.o.b. Pac. ports.)

Floor Plates: Pittsburgh, Chicago, 3.35c; Pacific ports, 4.00c.

Open-Hearth Alloy Plates: Pittsburgh, Chicago, Coatesville, 3.50c; Gulf ports 3.95c; Pacific ports 4.15c.

Wrought Iron Plates: Pittsburgh, 3.80c.

Shapes

Structural Shapes: Pittsburgh, Chicago, Gary, Birmingham, Buffalo, Bethlehem, 2.10c; New York, del. 2.27c; Phila., del. 2.215c; Pacific ports, 2.75c.

(Phoenix Iron Co., Phoenixville, Pa., may quote carbon steel shapes at 2.35c at established basing points and 2.50c, Phoenixville, for export; Sheffield Steel Corp., 2.55c f.o.b St. Louis. Geneva Steel Co., 3.25c, Pac. ports); Kaiser Co. Inc., 3.20c f.o.b. Los Angeles.)

Steel Sheet Piling: Pittsburgh, Chicago, Buffalo, 2.40c.

Wire Products, Nails

Wire: Pittsburgh, Chicago, Cleveland, Birmingham (except spring wire) to manufacturers in carloads (add $2 for Worcester, $1 for Duluth).

Bright basic, bessemer wire 2.60c
Spring wire 3.20c
(Pittsburgh Steel Co., 0.20c higher.)

Wire Products to the Trade:

Standard and Cement-coated wire nails, and staples, 100-lb. keg, Pittsburgh, Chicago, Birmingham, Cleveland, Duluth $2.80; galvanized, $2.55; Pac. ports ..... $3.30 and $3.05
Annealed fence wire, 100-lb., Pittsburgh, Chicago, Cleveland 3.05c
Galvanized fence wire, 100 lb., Pittsburgh, Chicago, Cleveland 3.40c
Woven fence, 15½ gage and heavier, per base column ..... .67c
Barbed wire, 80-rod spool, Pittsburgh, Chicago, Cleveland, Birmingham, column 70; twisted barbless wire, column 70.

Tubular Goods

Welded Pipe: Base price in carloads, threaded and coupled to consumers about $200 per net ton. Base discounts on steel pipe Pittsburgh and Lorain, O.; Gary, Ind. 2 points less on lap weld, 1 point less on butt weld. Pittsburgh base only on wrought iron pipe.

Butt Weld

Steel In.	Blk.	Galv.	Iron In.	Blk.	Galv
⅛	56	33	¼	24	3½
¼ & ⅜	59	40½	⅜	30	10
½	63½	51	1-1¼	34	16
¾	66½	55	1½	38	18½
1-3	68½	57½	2	37½	18

Lap Weld

Steel In.	Blk.	Galv.	Iron In.	Blk.	Galv.
2	61	49½	1¼	23	3½
2½-3	64	52½	1½	28½	10
3½-6	66	54½	2	30½	12
7-8	65	52½	2½, 3½	31½	14½
9-10	64½	52	4	33½	18
11-12	63½	51	4½-8	32½	17
			9-12	28½	12

Boiler Tubes: Net base prices per 100 feet f.o.b. Pittsburgh in carload lots, minimum wall, cut lengths 4 to 24 feet, inclusive.

O.D. Sizes	B.W.G.	—Seamless— Hot Rolled	Cold Drawn	—Lap Weld— Steel	Charcoal Iron
1"	13	$ 7.82	$ 9.01	.....	...
1¼"	13	9.26	10.67	.....	.....
1½"	13	10.23	11.72	$ 9.72	$23.71
1¾"	13	11.64	13.42	11.06	22.93
2"	13	13.04	15.03	12.38	19.35
2¼"	13	14.54	16.76	13.79	21.63
2½"	12	16.01	18.45	15.16	.....
2¾"	12	17.54	20.21	16.58	26.57
3"	12	18.59	21.42	17.54	29.00
3½"	12	19.50	22.48	18.35	31.38
4"	11	24.63	28.37	23.15	39.81
4½"	10	30.54	35.20	28.66	49.90
5"	10	37.35	43.04	35.22	.....
6"	9	46.87	54.01	44.25	73.93
	7	71.96	82.93	68.14	.....

Rails, Supplies

Standard rails, over 60-lb., f.o.b. mill, gross ton, $43.00. Light rails (billet), Pittsburgh, Chicago, Birmingham, gross ton, $43.00.

*Relaying rails, 35 lbs. and over, f.o.b. railroad and basing points, $31-$33.

Supplies: Track bolts, 4.75c; heat treated, 5.00c. Tie plates, $43 net ton, base, Standard spikes, 3.00c.

*Fixed by OPA Schedule No. 46, Dec. 15, 1941.

Tool Steels

Tool Steels: Pittsburgh, Bethlehem, Syracuse, base, cents per lb.; Reg. carbon 14.00c; extra carbon 18.00c; special carbon 22.00c; oil-hardening 24.00c; high car.-chr. 43.00c.

Tung	Chr.	Van.	Moly.	Pitts. base per lb.
18.00	4	1	...	67.00c
1.5	4	1	8.5	54.00c
...	4	2	8	54.00c
5.50	4	1.50	4	57.50c
5.50	4.50	4	4.50	70.00c

Stainless Steels

Base, Cents per lb.—f.o.b. Pittsburgh

CHROMIUM NICKEL STEEL

Type	Bars	Plates	Sheets	H. R. Strip	C. R. Strip
302	24.00c	27.00c	34.00c	21.50c	28.00c
303	26.00	29.00	36.00	27.00	33.00
304	25.00	29.00	36.00	23.50	30.00
308	29.00	34.00	41.00	28.50	35.00
309	36.00	40.00	47.00	37.00	47.00
310	49.00	52.00	53.00	48.75	56.00
312	36.00	40.00	49.00	.....	.....
*316	40.00	44.00	48.00	40.00	48.00
†321	29.00	34.00	41.00	29.25	38.00
‡347	33.00	38.00	45.00	33.00	42.00
431	19.00	22.00	29.00	17.50	22.50

STRAIGHT CHROMIUM STEEL

403	21.50	24.50	29.50	21.25	27.00
**410	18.50	21.50	26.50	17.00	22.00
416	19.00	22.00	27.00	18.25	23.50
††420	24.00	28.50	33.50	23.75	36.50
430	19.00	22.00	29.00	17.50	22.50
‡‡430F	19.50	22.50	29.50	18.75	24.50
440A	24.00	28.50	33.50	23.75	36.50
442	22.50	25.50	32.50	24.00	32.00
443	22.50	25.50	32.50	24.00	32.00
446	27.50	30.50	36.50	35.00	52.00
501	8.00	12.00	15.75	12.00	17.00
502	9.00	13.00	16.75	13.00	18.00

STAINLESS CLAD STEEL (20%)

304	.....	§§18.00	19.00	.....	.....

*With 2-3% moly. †With titanium. ‡With columbium. **Plus machining agent. ††High carbon. ‡‡Free machining. §§Includes annealing and pickling.

Basing Point Prices are (1) those announced by U. S. Steel Corp. subsidiaries for first quarter of 1941 or in effect April 16, 1941 at designated basing points or (2) those prices announced or customarily quoted by other producers at the same designated points. Base prices under (2) cannot exceed those under (1) except to the extent prevailing in third quarter of 1940.

Extras mean additions or deductions from base prices in effect April 16, 1941.

Delivered prices applying to Detroit, Eastern Michigan, Gulf and Pacific Coast points are deemed basing points except in the case of the latter two areas when water transportation is not available, in which case nearest basing point price, plus all-rail freight may be charged.

Domestic Ceiling prices are the aggregate of (1) governing basing point price, (2) extras and (3) transportation charges to the point of delivery as customarily computed. **Governing basing point** is basing point nearest the consumer providing the lowest delivered price.

Seconds, maximum prices: flat-rolled rejects 75% of prime prices, wasters 75%, waste-wasters 65% except plates, which take waster prices; tin plate $2.80 per 100 lbs.; terne plate $2.25; semifinished 85% of primes; other grades limited to new material ceilings.

Export ceiling prices may be either the aggregate of (1) governing basing point or emergency basing point (2) export extras (3) export transportation charges provided they are the f.a.s. seaboard quotations of the U. S. Steel Export Co. on April 16, 1941.

Bolts, Nuts

F.o.b. Pittsburgh, Cleveland, Birmingham, Chicago. Discounts for carloads additional 5%, full containers, add 10%

Carriage and Machine

½ x 6 and smaller ..... 65½ off
Do., ⅞ and ⅝ x 6-in. and shorter .. 63½ off
Do., ¾ to 1 x 6-in. and shorter ..... 61 off
1⅛ and larger, all lengths ..... 59 off
All diameters, over 6-in. long ..... 59 off
Tire bolts ..... 50 off
Step bolts ..... 56 off
Plow bolts ..... 65 off

Stove Bolts

In packages with nuts separate 71-10 off; with nuts attached 71 off; bulk 80 off on 15,000 of 3-inch and shorter, or 5000 over 3-in.

Nuts

Semifinished hex	U.S.S.	S.A.E.
⅞-inch and less	62	64
1-1-inch	59	60
1⅛-1½-inch	57	58
1⅝ and larger	56	

Hexagon Cap Screws

Upset 1-in., smaller ..... 64 off
Milled 1-in., smaller ..... 60 off

Square Head Set Screws

Upset, 1-in., smaller ..... 71 off
Headless, ¼-in., larger ..... 60 off
No. 10, smaller ..... 70 off

Piling

Pittsburgh, Chicago, Buffalo 2.40c

Rivets, Washers

F.o.b. Pittsburgh, Cleveland, Chicago, Birmingham

Structural 3.75c
⅞-inch and under ..... 65-5 off
Wrought Washers, Pittsburgh, Chicago, Philadelphia, to jobbers and large nut, bolt manufacturers l.c.l. ... $2.75-3.00 off

Metallurgical Coke

Price Per Net Ton

Beehive Ovens

Connellsville, furnace *7.00
Connellsville, foundry 7.50- 8.00
Connellsville, prem. fdry. 7.75- 8.10
New River, foundry 8.50- 8.75
Wise county, foundry 7.25- 7.75

By-Product Foundry

Wise county, furnace 6.75- 7.25
Kearney, N. J., ovens 12.65
Chicago, outside delivered 12.60
Chicago, delivered 13.35
Terre Haute, delivered 13.10
Milwaukee, ovens 13.35
New England, delivered 14.25
St. Louis, delivered ..... †13.35
Birmingham, delivered 10.50
Indianapolis, delivered 13.10
Cincinnati, delivered 12.85
Cleveland, delivered 12.80
Buffalo, delivered 13.00
Detroit, delivered 13.35
Philadelphia, delivered 12.88

*Operators of hand-drawn ovens using trucked coal may charge $7.75, effective Nov. 29, 1943.
†13.85 from other than Ala., Mo., Tenn.

Coke By-Products

Spot, gal., freight allowed east of Omaha

Pure and 90% benzol 15.00c
Toluol, two degree 28.00c
Solvent naphtha 27.00c
Industrial xylol 27.00c

Per lb. f.o.b. works

Phenol (car lots, returnable drums) 12.50c
Do., less than car lots 13.25c
Do., tank cars 11.50c

Eastern Plants, per lb.

Naphthalene flakes, balls, bbls., to jobbers 8.00c

Per ton, bulk, f.o.b. port

Sulphate of ammonia $29.20

WAREHOUSE STEEL PRICES

Base delivered price, cents per pound, for delivery within switching limits, subject to established extras.

	Hot rolled bars	Structural shapes	Plates	Floor plates	Hot rolled sheets (10 gage base)	Hot rolled bands (12 gage and heavier)	Hot rolled hoops (14 gage and lighter)	Galvanized flat sheets (24 gage base)	Cold-rolled sheets (17 gage base)	Cold finished bars	Cold-rolled strip	NE hot bars 8600 series	NE hot bars 9400 series
Boston	4.044[1]	3.912[1]	3.912[1]	5.727[1]	3.774[1]	4.106[1]	5.106[1]	5.224[14]	4.744[14]	4.144[11]	4.715	6.012[25]	6.012[25]
New York	3.853[1]	3.758[1]	3.768[1]	5.574[1]	3.590[1]	3.974[1]	3.974[1]	5.010[13]	4.613[14]	4.103[21]	4.774	.....	.....
Jersey City	3.853[1]	3.747[1]	3.768[1]	5.574[1]	3.590[1]	3.974[1]	3.974[1]	5.010[13]	4.613[14]	4.103[21]	4.774	.....	.....
Philadelphia	3.822[1]	3.666[1]	3.605[1]	5.272[1]	3.518[1]	3.922[1]	4.272[1]	5.018[13]	4.872[26]	4.072[21]	4.772	5.816[25]	5.866[25]
Baltimore	3.802[1]	3.759[1]	3.594[1]	5.252[1]	3.394[1]	3.902[1]	4.252[1]	4.894[1]	4.852[26]	4.052[21]	.....	.....	.....
Washington	3.941[1]	3.930[1]	3.796[1]	5.341[1]	3.596[1]	4.041[1]	4.391[1]	5.196[17]	4.841[26]	4.041[21]	.....	.....	.....
Norfolk, Va.	4.065[1]	4.002[1]	3.971[1]	5.465[1]	3.771[1]	4.165[1]	4.515[1]	5.371[17]	4.965[24]	4.165[21]	.....	.....	.....
Bethlehem, Pa.*	.....	3.45[1]	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
Claymont, Del.*	.....	.....	3.45[1]	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
Coatesville, Pa.*	.....	.....	3.45[1]	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
Buffalo (city)	3.35[1]	3.40[1]	3.63[1]	5.26[1]	3.35[1]	3.819[1]	3.819[1]	4.75[15]	4.40[10]	3.75[21]	4.669	5.60[25]	5.75[25]
Buffalo (country)	3.25[1]	3.30[1]	3.30[1]	4.90[1]	3.25[1]	3.81[1]	3.50[1]	4.65[15]	4.30[10]	3.65[21]	4.35	5.60[25]	5.75[25]
Pittsburgh (city)	3.35[1]	3.40[1]	3.40[1]	5.00[1]	3.35[1]	3.60[1]	3.60[1]	4.75[15]	4.40[24]	3.75[21]	.....	.....	.....
Pittsburgh (country)	3.25[1]	3.30[1]	3.30[1]	4.90[1]	3.25[1]	3.50[1]	3.50[1]	4.65[12]	4.30[24]	3.65[21]	.....	.....	.....
Cleveland (city)	3.35[1]	3.588[1]	3.40[1]	5.188[1]	3.35[1]	3.60[1]	3.60[1]	4.877[15]	4.40[24]	3.75[21]	4.45[31]	5.60[25]	5.65[25]
Cleveland (country)	3.25[1]	.....	3.30[1]	.....	3.25[1]	3.50[1]	3.50[1]	.....	4.30[24]	3.65[21]	4.35[31]	.....	.....
Detroit	3.450[1]	3.661[1]	3.609[1]	5.281[1]	3.450[1]	3.700[1]	3.700[1]	5.000[13]	4.500[24]	3.800[21]	4.659	5.93[25]	5.93[25]
Omaha (city, delivered)	4.115[1]	4.165[1]	4.165[1]	5.765[1]	3.865[1]	4.215[1]	4.215[1]	5.608[19]	5.443[24]	4.443[13]	.....	.....	.....
Omaha (country, base)	4.015[1]	4.065[1]	4.065[1]	5.665[1]	3.765[1]	4.115[1]	4.115[1]	5.508[19]	.....	.....	.....	.....	.....
Cincinnati	3.611[1]	6.391[1]	3.661[1]	5.291[1]	3.425[1]	3.675[1]	3.675[1]	4.825[13]	4.475[24]	4.011[21]	4.711	6.10	6.20
Youngstown, O.*	.....	.....	.....	.....	.....	.....	.....	4.40[13]	.....	.....	.....	.....	.....
Middletown, O.*	.....	.....	.....	.....	3.25[1]	3.50[1]	3.50[1]	4.65[16]	.....	.....	.....	.....	.....
Chicago (city)	3.50[1]	3.55[1]	3.55[1]	5.15[1]	3.25[1]	3.60[1]	3.60[1]	5.231[15]	4.20[24]	3.75[21]	4.65	5.75[25]	5.85[25]
Milwaukee	3.637[1]	3.687[1]	3.687[1]	5.287[1]	3.387[1]	3.737[1]	3.737[1]	5.272[15]	4.337[24]	3.887[21]	4.787	5.987[25]	6.087[25]
Indianapolis	3.58[1]	3.63[1]	3.63[1]	5.23[1]	3.518[1]	3.768[1]	3.768[1]	4.918[15]	4.568[24]	3.98[21]	4.78	6.08[25]	6.18[25]
St. Paul	3.76[8]	3.81[3]	3.81[3]	5.41[3]	3.51[3]	3.86[3]	3.86[3]	5.257[15]	4.46[24]	4.361[21]	5.102	6.09[25]	6.19[25]
St. Louis	3.647[1]	3.697[1]	3.697[1]	5.297[1]	3.397[1]	3.747[1]	3.747[1]	5.172[15]	4.347[24]	4.031[21]	4.931	6.131[25]	6.231[25]
Memphis, Tenn.	4.015[5]	4.065[5]	4.065[5]	5.78[5]	3.965[5]	4.215[5]	4.215[5]	5.265[15]	4.78[24]	4.33[21]	.....	.....	.....
Birmingham	3.50[1]	3.55[1]	3.55[1]	5.903[1]	3.45[1]	3.70[1]	3.70[1]	4.75[15]	4.852[24]	4.54	5.215	.....	.....
New Orleans (city)	4.10[4]	3.90[4]	3.90[4]	5.85[4]	4.058[4]	4.20[4]	4.20[4]	5.25[26]	5.079[10]	4.60[21]	5.429	.....	.....
Houston, Tex.	3.75[3]	4.25[3]	4.25[3]	5.50[3]	3.763[3]	4.313[3]	4.313[3]	5.313[26]	4.10[10]	3.65[21]	.....	.....	.....
Los Angeles	4.40[4]	4.65[4]	4.95[4]	7.20[4]	5.00[4]	4.95[4]	6.75[4]	6.00[13]	7.20[8]	5.583[26]	5.613	5.85[25]	5.95[25]
San Francisco	4.15[7]	4.35[7]	4.65[7]	6.35[7]	4.55[7]	4.50[7]	5.75[7]	6.35[15]	7.30[15]	5.333[21]	7.333	8.304[25]	8.404[25]
Portland, Oreg.	4.45[27]	4.45[27]	4.75[27]	6.50[27]	4.65[27]	4.75[27]	6.30[27]	5.75[15]	6.60[15]	5.533[15]	.....	.....	.....
Tacoma	4.35[8]	4.45[8]	4.75[8]	6.50[8]	4.65[8]	4.25[8]	5.45[8]	5.95[15]	7.60[15]	5.783[21]	.....	.....	8.00[25]
Seattle	4.35[8]	4.45[8]	4.75[8]	6.50[8]	4.65[8]	4.25[8]	5.45[8]	5.95[15]	7.05[15]	5.783[21]	.....	.....	8.00[25]

*Basing point cities with quotations representing mill prices, plus warehouse spread.

NOTE—All prices fixed by Office of Price Administration in Amendments Nos. 10 to 18 to Revised Price Schedule No. 49. Deliveries outside above cities computed in accordance with regulations.

BASE QUANTITIES

[1]—400 to 1999 pounds; [2]—400 to 14,999 pounds; [3]—any quantity; [4]—300 to 1999 pounds; [5]—400 to 8999 pounds; [6]—300 to 9999 pounds; [7]—400 to 39,999 pounds; [8]—under 2000 pounds; [9]—under 4000 pounds; [10]—500 to 1499 pounds; [11]—one bundle to 39,999 pounds; [12]—150 to 2249 pounds; [13]—150 to 1499 pounds; [14]—three to 24 bundles; [15]—450 to 1499 pounds; [16]—one bundle to 1499 pounds; [17]—one to nine bundles; [18]—one to six bundles; [19]—100 to 749 pounds; [20]—300 to 1999 pounds; [21]—1500 to 39,999 pounds; [22]—1500 to 1999 pounds; [23]—1000 to 39,999 pounds; [24]—400 to 1499 pounds; [25]—1000 to 1999 pounds; [26]—under 25 bundles. Cold-rolled strip, 2000 to 39,999 pounds, base; [27]—300 to 4999 pounds.

Ores

Lake Superior Iron Ore

Gross ton, 51½% (Natural)

Lower Lake Ports

Old range bessemer	$4.75
Mesabi nonbessemer	4.45
High phosphorus	4.35
Mesabi bessemer	4.60
Old range nonbessemer	4.60

Eastern Local Ore

Cents, units, del. E. Pa.

Foundry and basic 56-68% contract	13.00

Foreign Ore

Cents per unit, c.i.f. Atlantic ports

Manganiferous ore, 45-55% Fe., 6-10% Mang.	Nom.
N. African low phos.	Nom.
Spanish, No. African basic, 50 to 60%	Nom.
Brazil iron ore, 68-69% f.o.b. Rio de Janeiro	7.50-8.00

Tungsten Ore

Chinese wolframite, per short ton unit, duty paid	$24.00

Chrome Ore

(Equivalent OPA schedules):

Gross ton f.o.b. cars, New York, Philadelphia, Baltimore, Charleston, S. C., Portland, Ore., or Tacoma, Wash.

(S/S paying for discharging; dry basis; subject to penalties if guarantees are not met.)

Indian and African

48% 2.8:1	$41.00
48% 3:1	43.50
48% no ratio	31.00

South African (Transvaal)

44% no ratio	$27.40
45% no ratio	28.30
48% no ratio	31.00
50% no ratio	32.80

Brazilian—nominal

44% 2.5:1 lump	33.65
48% 3:1 lump	43.50

Rhodesian

45% no ratio	28.30
48% no ratio	31.00
48% 3:1 lump	43.50

Domestic (seller's nearest rail)

48% 3:1	52.80

less $7 freight allowance

Manganese Ore

Sales prices of Metals Reserve Co., cents per gross ton unit, dry, 48%, at New York, Philadelphia, Baltimore, Norfolk, Mobile and New Orleans, 85.0c; Fontana, Calif., Provo, Utah, and Pueblo, Colo., 91.0c; prices include duty on imported ore and are subject to premiums, penalties and other provisions of amended M.P.R. No. 248, effective as of May 15. Price at basing points which are also points of discharge of imported manganese ore is f.o.b. cars, shipside, at dock most favorable to the buyer.

Molybdenum

Sulphide conc., lb., Mo. cont., mines	$0.75

NATIONAL EMERGENCY STEELS (Hot Rolled)

(Extras for alloy content)

Designation	Carbon	Mn.	Si.	Cr.	Ni.	Mo.	Basic open-hearth Electric furnace Bars per 100 lb.	Billets per GT	Bars per 100 lb.	Billets per GT
	Chemical Composition Limits, Per Cent									
NE 8612	.10-.15	.70-.90	.20-.35	.40-.60	.40-.70	.15-.25	$0.65	$13.00	$1.15	$23.00
NE 8720	.18-.23	.70-.90	.20-.35	.40-.60	.40-.70	.20-.30	.70	14.00	1.20	24.00
NE 9415	.13-.18	.80-1.10	.20-.35	.30-.50	.30-.60	.08-.15	.75	15.00	1.25	25.00
NE 9425	.23-.28	.80-1.20	.20-.35	.30-.50	.30-.60	.08-.15	.75	15.00	1.25	25.00
NE 9442	.40-.45	1.00-1.30	.20-.35	.30-.50	.30-.60	.08-.15	.80	16.00	1.30	26.00
NE 9722	.20-.25	.50-.80	.20-.35	.10-.25	.40-.70	.15-.25	.65	13.00	1.15	23.00
NE 9830	.28-.33	.70-.90	.20-.35	.70-.90	.85-1.15	.20-.30	1.30	26.00	1.80	36.00
NE 9912	.10-.15	.50-.70	.20-.35	.40-.60	1.00-1.30	.20-.30	1.20	24.00	1.55	31.00
NE 9920	.18-.23	.50-.70	.20-.35	.40-.60	1.00-1.30	.20-.30	1.20	24.00	1.55	31.00

Extras are in addition to a base price of 2.70c, per pound on finished products and $54 per gross ton on semifinished steel major basing points and are in cents per pound and dollars per gross ton. No prices quoted on vanadium alloy.

Pig Iron

Prices (in gross tons) are maximums fixed by OPA Price Schedule No. 10, effective June 10, 1941. Exceptions indicated in footnotes. Allocation regulations from WPB Order M-17, expiring Dec. 31, 1942. Base prices bold face, delivered light face. Federal tax on freight charges, effective Dec. 1, 1942, not included in following prices.

	Foundry	Basic	Bessemer	Malleable
Bethlehem, Pa., base	$25.00	$24.50	$26.00	$25.50
Newark, N. J., del.	26.53	26.03	27.53	27.03
Brooklyn, N. Y., del.	27.50	.....	.....	28.00
Birdsboro, Pa., base	25.00	24.50	26.00	25.50
Birmingham, base	†20.38	†19.00	25.00	.....
Baltimore, del.	25.61	.....	.....	.....
Boston, del.	25.12	.....	.....	.....
Chicago, del.	24.22	.....	.....	.....
Cincinnati, del.	24.06	22.68	.....	.....
Cleveland, del.	24.12	23.24	.....	.....
Newark, N. J., del.	26.15	.....	.....	.....
Philadelphia, del.	25.46	24.96	.....	.....
St. Louis, del.	24.12	23.24	.....	.....
Buffalo, base	24.00	23.00	25.00	24.50
Boston, del.	25.50	25.00	26.50	26.00
Rochester, del.	25.53	.....	26.53	26.03
Syracuse, del.	26.08	.....	27.08	26.58
Chicago, base	24.00	23.50	24.50	24.00
Milwaukee, del.	25.10	24.60	25.60	25.10
Muskegon, Mich., del.	27.19	.....	.....	27.19
Cleveland, base	24.00	23.50	24.50	24.00
Akron, Canton, O., del.	25.39	24.89	25.89	25.39
Detroit, base	24.00	23.50	24.50	24.00
Saginaw, Mich., del	26.31	25.81	26.81	26.31
Duluth, base	24.50	24.00	25.00	24.50
St. Paul, del.	26.63	26.13	27.13	26.63
Erie, Pa., base	24.00	23.50	25.00	24.50
Everett, Mass., base	25.00	24.50	26.00	25.50
Boston, del.	25.50	25.00	26.50	26.00
Granite City, Ill., base	24.00	23.50	24.50	24.00
St. Louis, del.	24.50	24.00	.....	24.50
Hamilton, O., base	24.00	23.50	.....	24.00
Cincinnati, del.	24.44	24.61	.....	25.11
Neville Island, Pa., base	24.00	23.50	24.50	24.00
§Pittsburgh, del.				
Baltimore, del.	25.99	.....	.....	.....
No. & So. sides	24.69	24.19	25.19	24.69
Provo, Utah, base	22.00	21.50	.....	.....
Sharpsville, Pa., base	24.00	23.50	24.50	24.00
Sparrows Point, base	25.00	24.50	.....	.....
Steelton, Pa., base	.....	24.50	.....	25.50
Swedeland, Pa., base	25.00	24.50	26.00	25.50
Philadelphia, del.	25.84	25.34	.....	26.34
Toledo, O., base	24.00	23.50	24.50	24.00
Youngstown, O., base	24.00	23.50	24.50	24.00
Mansfield, O., del.	25.94	25.44	25.44	25.94

Base grade, silicon 1.75-2.25%; add 50 cents for each additional 0.25% silicon, or portion thereof; deduct 50 cents for silicon below 1.75% on foundry iron. †For phosphorus 0.70% or over deduct 38 cents. §For McKees Rocks, Pa., add .55 to Neville Island base; Lawrenceville, Homestead, McKeesport, Ambridge, Monaca, Aliquippa, .84; Monessen, Monongahela City .97 (water); Oakmont, Verona 1.11; Brackenridge 1.24.

Note: Add 50 cents per ton for each 0.50% manganese or portion thereof over 1.00%.

Nickel differentials: Under 0.50%, no extra; 0.50% to 0.74% incl., $2 per ton; for each additional 0.25% nickel, $1 per ton.

High Silicon, Silvery

5.00-6.50 per cent (base).....$29.50

6.51-7.00	$30.50	9.01- 9.50	$35.50
7.01-7.50	31.50	9.51-10.00	36.50
7.51-8.00	32.50	10.01-10.50	37.50
8.01-8.50	33.50	10.51-11.00	38.50
8.51-9.00	34.50	11.01-11.50	39.50

F.o.b. Jackson county, O., per gross ton, Buffalo base prices are $1.25 higher. Prices subject to additional charge of 50 cents a ton for each 0.50% manganese in excess of 1.00%.

Bessemer Ferrosilicon

Prices same as for high silicon silvery iron, plus $1 per gross ton (For higher silicon irons a differential over and above the price of base grades is charged as well as for the hard chilling iron, Nos. 5 and 6.)

Charcoal Pig Iron

Northern

Lake Superior Furn. $34.00
Chicago, del. 37.34

Southern

Semi-cold blast, high phos., f.o.b. furnace, Lyles, Tenn. $28.50
Semi-cold blast, low phos., f.o.b. furnace, Lyles, Tenn. 33.00

Gray Forge

Neville Island, Pa. $23.50
Valley base 23.50

Low Phosphorus

Basing points: Birdsboro, Pa., $29.50; Steelton, Pa., and Buffalo, N. Y., $29.50 base; $30.74, del., Philadelphia. Intermediate phos., Central Furnace, Cleveland, $26.50.

Switching Charges: Basing point prices are subject to an additional charge for delivery within the switching limits of the respective districts.

Silicon Differentials: Basing point prices are subject to an additional charge not to exceed 50 cents a ton for each 0.25 silicon in excess of base grade (1.75 to 2.25%).

Phosphorus Differential: Basing point prices are subject to a reduction of 38 cents a ton for phosphorus content of 0.70% and over.

Manganese Differentials: Basing point prices subject to an additional charge not to exceed 50 cents a ton for each 0.50% manganese content in excess of 1.0%.

Ceiling Prices are the aggregate of (1) governing basing point (2) differentials (3) transportation charges from governing basing point to point of delivery as customarily computed. Governing basing point is the one resulting in the lowest delivered price for the consumer.

Exceptions to Ceiling Prices: Pittsburgh Coke & Iron Co., (Sharpsville, Pa. furnace only) and Struthers Iron & Steel Co. may charge 50 cents a ton in excess of basing point prices for No. 2 Foundry, Basic Bessemer and Malleable. Mystic Iron Works, Everett, Mass., may exceed basing point prices by $2 per ton, effective May 20, 1943. Chester, Pa., furnace of Pittsburgh Coke & Iron Co. may exceed basing point prices by $2.25 per ton, effective July 27, 1942. E. & G. Brooke Co., Birdsboro, Pa., allowed $1 above basing point.

Refractories

Per 1000 f.o.b. Works, Net Prices

Fire Clay Brick

Super Quality

Pa., Mo., Ky. $64.00

First Quality

Pa., Ill., Md., Mo., Ky.	51.30
Alabama, Georgia	51.30
New Jersey	56.00
Ohio	43.00

Second Quality

Pa., Ill., Md., Mo., Ky.	46.50
Alabama, Georgia	38.00
New Jersey	40.00
Ohio	36.00

Malleable Bung Brick

All bases $59.80

Silica Brick

Pennsylvania	$51.30
Joliet, E. Chicago	58.90
Birmingham, Ala.	51.30

Ladle Brick

(Pa., O., W. Va., Mo.)

Dry press	$31.00
Wire cut	30.00

Magnesite

Domestic dead-burned grains, net ton f.o.b. Chewelah, Wash., net ton, bulk	22.00
net ton, bags	26.00

Basic Brick

Net ton, f.o.b. Baltimore, Plymouth Meeting, Chester, Pa.

Chrome brick	$54.00
Chem. bonded chrome	54.00
Magnesite brick	76.00
Chem. bonded magnesite	65.00

Fluorspar

Metallurgical grade, f.o.b. Ill., Ky., net ton, carloads CaF_2 content, 70% or more, $33; 65 but less than 70%, $32; 60 but less than 65% $31; less than 60%, $30. (After Aug. 29 base price any grade $30.)

Ferroalloy Prices

Ferromanganese (standard) 78-82% c.l. gross ton, duty paid, eastern, central and western zones, $135; add $6 for packed c.l., $10 for ton, $13.50 less-ton; f.o.b. cars, New Orleans, $1.70 for each 1%, or fraction contained manganese over 82% or under 78%; delivered Pittsburgh, $140.33.

Ferromanganese (Low and Medium Carbon); per lb. contained manganese; eastern zone, low carbon, bulk, c.l., 23c; 2000 lb. to c.l., 23.40c; medium, 14.50c and 15.20c; central, low carbon, bulk, c.l., 23.30c; 2000 lb. to c.l., 24.40c; medium, 14.80c and 16.20c; western, low carbon, bulk, c.l., 24.50c, 2000 lb. to c.l., 25.40c; medium, 15.75c and 17.20c; f.o.b. shipping point, freight allowed.

Spiegeleisen: 19-21% carlots per gross ton, Palmerton, Pa. $36; 16-19%, $35.

Electrolytic Manganese: 99.9% plus, less ton lots, per lb. 37.6 cents.

Chromium Metal: 97% min. chromium, max. .50% carbon, eastern zone, per lb. contained chromium bulk, c.l., 79.50c, 2000 lb. to c.l. 80c; central, 81c and 82.50c; western 82.25c and 84.75c; f.o.b. shipping point, freight allowed.

Ferrocolumbium: 50-60%, per lb. contained columbium in gross ton lots, contract basis, R.R. freight allowed, eastern zone, $2.25; less-ton lots $2.30. Spot prices 10 cents per lb. higher.

Ferrochrome: High carbon, eastern zone, bulk, c.l., 13c, 2000 lb. to c.l., 13.90c; central, add .40c and .65c; western, add 1c and 1.85c—high nitrogen, high carbon ferrochrome: Add 5c to all high carbon ferrochrome prices; all zones; low carbon eastern, bulk, c.l., max. 0.06% carbon, 23c, 0.10% 22.50c, 0.15% 22c, 0.20% 21.50c, 0.50% 21c, 1.00% 20.50c, 2.00% 19.50c; 2000 lb. to c.l., 0.06% 24c, 0.10% 23.50c, 0.15% 23c, 0.20% 22.50c, 0.50% 22c, 1.00% 21.50c, 2.00% 20.50c; central, add .4c for bulk, c.l. and .65c for 2000 lb. to c.l.; western, add 1c for bulk, c.l. and 1.85c for 2000 lb. to c.l.; carload packed differential .45c; f.o.b. shipping point, freight allowed. Prices per lb. contained Cr high nitrogen, low carbon ferrochrome: Add 2c to low carbon ferrochrome prices; all zones. For higher nitrogen carbon add 2c for each .25% of nitrogen over 0.75%.

Special Foundry ferrochrome: (Chrom. 62-66%, car. approx. 5-7%) Contract, carload, bulk, 13.50c packed 13.35c, ton lots 14.40c, less, 14.90c, eastern, freight allowed, per pound contained chromium; 13.90c, 14.35c, 15.05c and 15.55c central; 14.50c, 14.95c, 16.25c and 16.75c, western; spot up .25c.

S.M. Ferrochrome, high carbon: (Chrom. 60-65%, sil. 4-6%, mang. 4-6% and carbon 4-6%.) Contract, carlot, bulk, 14.00c, packed, 14.45c. ton lots 14.90c, less 15.40c, eastern, freight allowed; 14.40c, 14.85c, 15.55c and 16.05c, central; 15.00c, 15.45c, 16.75c and 17.25c, western; spot up .25c; per pound contained chromium.

S.M. Ferrochrome, low carbon: (Chrom. 62-66%, sil. 4-6%, mang. 7%) Contract, carload, bulk, 13.50c, 4-6% and carbon 1.25% max.) Contract, carlot, bulk, 20.00c, packed 20.45c, ton lots 21.00c, less ton lots 22.00c, eastern, freight allowed, per pound contained chromium; 20.40c, 20.85c, 21.65c and 22.65c, central; 21.00c, 21.45c, 22.85c and 23.85c, western; spot up .25c.

SMZ Alloy: (Silicon 60-65%, Mang. 5-7%, zir. 5-7% and iron approx. 20%) per lb. of alloy contract carlots 11.50c, ton lots 12.00c, less 12.50c, eastern zone, freight allowed; 12.00c, 12.85c and 13.35c central zone; 14.05c, 14.60c and 15.10c, western; spot up .25c.

Silcas Alloy: (Sil. 35-40%, cal. 9-11% alum. 6-8%, zir. 3-5%, tit. 9-11% and boron 0.55-0.75%), per lb. of alloy contract, carlots 25.00c, ton lots 26.00c, less ton lots 27.00c, eastern, freight allowed; 25.50c, 26.75c and 27.75c, central; 27.50c, 28.90c and 29.90c, western; spot up .25c.

Silvaz Alloy: (Sil. 35-40%, van. 9-11%, alum. 5-7%, zir. 5-7%, tit. 9-11% and boron 0.55-0.75%), per lb. of alloy. Contract, carlots 58.00c, ton lots 59.00c, less 60.00c, eastern, freight allowed; 58.50c, 59.75c and 60.75c, central; 60.50c, 61.90c and 62.90c, western; spot up ¼c.

CMSZ Alloy 4: (Chr. 45-49%, mang. 4-6%, sil. 18-21%, zir. 1.25-1.75%, and car. 3.00-4.50%). Contract, carlots, bulk, 11.00c and packed 11.50c; ton lots 12.00c; less 12.50c, eastern, freight allowed; 11.50c and 12.00c, 12.75c, 13.25c, central; 13.50c and 14.00c, 14.75c, 15.25c, western; spot up .25c.

CMSZ Alloy 5: (Chr. 50-56%, mang. 4-6%, sil. 13.50-16.00%, zir. .75-1.25%, car. 3.50-5.00%) per lb. of alloy. Contract, carlots, bulk, 10.75c, packed 11.25c, ton lots 11.75c, less 12.25c, eastern, freight allowed; 11.25c, 11.75c and 12.50c, central; 13.25c and 13.75c, 14.50c and 15.00c, western, spot up .25c.

Ferro-Boron: (Bor. 17.50% min., sil. 1.50% max., alum. 0.50% max. and car. 0.50% Max.) per lb. of alloy contract ton lots, $1.20, less ton lots $1.30, eastern, freight allowed; $1.2075 and $1.3075 central; $1.229 and $1.329, western; spot add 5c.

Manganese-Boron: (Mang. 75% approx., boron 15-20%, iron 5% max., sil. 1.50% max. and carbon 3% max.), per lb. of alloy. Contract, ton lots, $1.89, less, $2.01, eastern, freight allowed; $1.903 and $2.023 central, $1.935 and $2.055 western, spot up 5c.

Nickel-Boron: (Bor. 15-18%, alum. 1% max., sil. 1.50% max., car. 0.50% max., iron 3% max., nickel, balance), per lb. of alloy. Contract, 5 tons or more, $1.90, 1 ton to 5 tons, $2.00, less than ton $2.10, eastern, freight allowed; $1.9125, $2.0125 and $2.1125, central; $1.9445, $2.0445 and $2.1445, western; spot same as contract.

Chromium-Copper: (Chrom. 8-11%, cu. 88-90%, iron 1% max., sil. 0.50% max.) contract, any quantity, 45c, eastern, Niagara Falls, N. Y., basis, freight allowed to destination, except to points taking rate in excess of St. Louis rate, to which equivalent of St. Louis rate will be allowed; spot, up 2c.

Vanadium Oxide: (Fused: Vanadium oxide 85-88%, sodium oxide, approx. 10% and calcium oxide approx. 2%, or Red Cake: Vanadium oxide 85% approx., sodium oxide, approx. 9% and water approx.

2.5%) Contract, any quantity, $1.10 eastern, freight allowed, per pound vanadium oxide contained; contract, carlots, $1.105, less carlots, $1.108, central; $1.118 and $1.133, western; spot add 5c.4o contracts in all cases.

Calcium metal; cast: Contract, ton lots or more $1.80, less, $2.30, eastern zone, freight allowed, per pound of metal; $1.809 and $2.309, Central, $1.849 and $2.349, western; spot up 5c.

Calcium-Manganese-Silicon: (Cal. 16-20%, mang. 14-18% and sil. 53-59%), per lb. of alloy. Contract, carlots, 15.50c, ton lots 16.50c and less 17.00c, eastern, freight allowed: 16.00c, 17.35c and 17.85c, central; 18.05c, 19.10c and 19.60c western; spot up .25c.

Calcium-Silicon: (Cal. 30-35%, sil. 60-65% and iron 3.00% max.), per lb. of alloy. Contract, carlot, lump 13.00c, ton lots 14.50c, less 15.50c, eastern, freight allowed; 13.50c, 15.25c and 16.25c central; 15.55c, 17.40c and 18.40c, western; spot up .25c.

Briquets, Ferromanganese: (Weight approx. 3 lbs. and containing exactly 2 lbs. mang.), per lb. of briquets. Contract, carlots, bulk .0605c, packed .063c, tons .0655c, less .068c, eastern, freight allowed; .063c, .0855c, .0755c and .078c, central; .066c, .0685c, .0855c and .088c, western; spot up .25c.

Briquets: Ferrochrome, containing exactly 2 lb. cr., eastern zone, bulk, c.l., 8.25c per lb. of briquets, 2000 lb. to c.l., 8.75c; central, add .3c for c.l. and .5c for 2000 lb. to c.l.; western, add .70c for c.l., and .2c for 2000 lb. to c.l.; **silicomanganese,** eastern, containing exactly 2 lb. manganese and approx. ½ lb. silicon, bulk, c.l., 5.80c, 2000 lbs. to c.l., 6.30c; central, add .25c for c.l. and 1c for 2000 lb. to c.l.; western, add .5c for c.l., and 2c for 2000 lb. to c.l.; **ferrosilicon,** eastern, approx. 5 lb., containing exactly 2 lb. silicon, or weighing approx. 2½ lb. and containing exactly 1 lb. of silicon, bulk, c.l., 3.35c, 2000 lb. to c.l., 3.80c; central, add 1.50c for c.l., and .40c for 2000 lb. to c.l.; western, add 3.0c for c.l. and .45c for 2000 to c.l.; f.o.b. shipping point, freight allowed.

Ferromolybdenum: 55-75% per lb. contained molybdenum, f.o.b. Langeloth and Washington, Pa., furnace, any quantity 95.00c.

Ferrophosphorus: 17-19%, based on 18% phosphorus content, with unitage of $3 for each 1% of phosphorus above or below the base; gross tons per carload f.o.b. sellers' works, with freight equalized with Rockdale, Tenn.; contract price $58.50, spot $62.25.

Ferrosilicon: Eastern zone, 90-95%, bulk, c.l., 11.05c, 2000 lb. to c.l., 12.30c; 80-90%, bulk c.l., 8.90c, 2000 lb. to c.l., 9.95c; 75%, bulk, c.l., 8.05c, 2000 lb. to c.l., 9.05c; 50%, bulk c.l., 6.65c and 2000 lb. to c.l., 7.85c; central 90-95%, bulk, c.l., 11.20c, 2000 lb. to c.l., 12.80c; 80-90%, bulk, c.l., 9.05c, 2000 to c.l., 10.45c; 75%, bulk, c.l., 8.20c 2000 lb. to c.l., 9.65c; 50% bulk, c.l., 7.10c, 2000 lb. to c.l., 9.70c; western, 90-95%, bulk, c.l., 11.65c, 2000 lb. to c.l., 15.60c; 80-90%, bulk, c.l., 9.55c, 2000 lb. to c.l., 13.50c; 75%, bulk, c.l., 8.75c, 2000 to c.l., 13.10c; 50%, bulk, c.l., 7.25c, 2000 to c.l., 8.75c; f.o.b. shipping point, freight allowed. Prices per lb. contained silicon.

Silicon Metal: Min. 97% silicon and max. 1% iron, eastern zone, bulk, c.l., 12.90c, 2000 lb. to c.l., 13.45c; central, 13.20c and 13.90c; western, 13.85c and 16.80c; min. 96% silicon and max. 2% iron, eastern, bulk, c.l., 12.50c, 2000 lb. to c.l., 13.10c; central, 12.80c and 13.55c; western, 13.45c and 16.50c; f.o.b. shipping point, freight allowed. Prices per lb. contained silicon.

Manganese Metal: (96 to 98% manganese, max. 2% iron), per lb. of metal, eastern zone, bulk, c.l., 36c, 2000 lb. to c.l., 38c, central, 36.25c, and 39c; western, 36.55c and 41.05c; 95 to 97% manganese, max. 2.50% iron, eastern, bulk, c.l., 34c; 2000 c.l., 35c; central, 34.25c and 36c; western, 34.55c and 38.05c; f.o.b. shipping point, freight allowed.

Ferrotungsten: Carlots, per lb. contained tungsten, $1.90.

Tungsten Metal Powder: 98-99% per lb. any quantity $2.55-2.65.

Ferrotitanium: 40-45%, R.R. freight allowed, per lb. contained titanium; ton lots $1.23; less-ton lots $1.25; eastern. Spot up 5 cents per lb.

Ferrotitanium: 20-25%, 0.10 maximum carbon; per lb. contained titanium; ton lots $1.35; less-ton lots $1.40; eastern. Spot 5 cents per lb. higher.

High-Carbon Ferrotitanium: 15-20% contract basis, per gross ton, f.o.b. Niagara Falls, N. Y., freight allowed to destination east of Mississippi River and North of Baltimore and St. Louis, 6-8% carbon $142.50; 3-5% carbon $157.50.

Carbortam: Boron 0.90 to 1.15%, net ton to carload, 8c lb. F.O.B. Suspension Bridge, N. Y., frt. allowed same as high-carbon ferrotitanium.

Bortam: Boron 1.5-1.9%, ton lots 45c lb., less ton lots 50c lb.

Ferrovanadium: 35-55%, contract basis, per lb. contained vanadium, f.o.b. producers plant with usual freight allowances; open-hearth grade $2.70; special grade $2.80; highly-special grade $2.90.

Zirconium Alloys: 12-15%, per lb. of alloy, eastern, contract, carlots, bulk, 4.60c, packed 4.80c, ton lots 4.80c, less tons 5c, carloads bulk, per gross ton $102.50; packed $107.50; ton lots $108; less-ton lots $112.50. Spot ¼c per ton higher.

Zirconium Alloy: 35-40%, Eastern, contract basis, carloads in bulk or package, per lb. of alloy 14.00c; gross ton lots 15.00c; less-ton lots 16.00c. Spot ¼ cent higher.

Alsifer: (Approx. 20% aluminum, 40% silicon, 40% iron) contract basis f.o.b. Niagara Falls, N. Y., per lb. 5.75; ton lots 6.50c. Spot ½ cent higher.

Simanal: (Approx. 20% each Si., Mn., Al.) Contract, frt. all. not over St. Louis rate, per lb. alloy; carlots 8c; ton lots 8.75c; less ton lots 9.25c.

Borosil: 3 to 4% boron, 40 to 45% Si., $6.25 lb. cont. Bo., f.o.b. Philo, O., freight not exceeding St. Louis rate allowed.

OPEN MARKET PRICES, IRON AND STEEL SCRAP

Following prices are quotations developed by editors of STEEL in the various centers. For complete OPA ceiling price schedule refer to page 156 of Sept. 4, 1944, issue of STEEL.

PHILADELPHIA:

(Delivered consumer's plant)

No. 1 Heavy Melt. Steel	$18.75
No. 2 Heavy Melt. Steel	18.75
No. 1 Bundles	18.75
No. 2 Bundles	18.75
No. 3 Bundles	16.75
Machine Shop Turnings	13.75
Mixed Borings, Turnings	13.75
Shoveling Turnings	15.75
No. 2 Busheling	15.50
Billet, Forge Crops	21.25
Bar Crops, Plate Scrap	21.25
Cast Steel	21.25
Punchings	21.25
Elec. Furnace Bundles	19.75
Heavy Turnings	18.25

Cast Grades

(F.o.b. Shipping Point)

Heavy Breakable Cast	16.50
Charging Box Cast	19.00
Cupola Cast	20.00
Unstripped Motor Blocks	17.50
Malleable	22.00
Chemical Borings	16.51

NEW YORK:

(Dealers' buying prices.)

No. 1 Heavy Melt. Steel	$15.33
No. 2 Heavy Melt. Steel	15.33
No. 2 Hyd. Bundles	15.33
No. 3 Hyd. Bundles	13.33
Chemical Borings	14.33
Machine Turning	10.33
Mixed Borings, Turnings	10.33
No. 1 Cupola	20.00
Charging Box	19.00
Heavy Breakable	16.50
Unstrip Motor Blocks	17.50
Stove Plate	19.00

CLEVELAND:

(Delivered consumer's plant)

No. 1 Heavy Melt. Steel	$19.50
No. 2 Heavy Melt. Steel	19.50
No. 1 Comp. Bundles	19.50
No. 2 Comp. Bundles	19.50
No. 1 Busheling	19.50
Mach. Shop Turnings	12.50-13.00
Short Shovel Turnings	12.50-13.00
Mixed Borings, Turnings	12.50-13.00
No. 1 Cupola Cast	20.00
Heavy Breakable Cast	16.50
Cast Iron Borings	15.50
Billet, Bloom Crops	24.50
Sheet Bar Crops	22.00
Plate Scrap, Punchings	22.00
Elec. Furnace Bundles	20.50

BOSTON:

(F.o.b. shipping points)

No. 1 Heavy Melt. Steel	$14.06*
No. 2 Heavy Melt. Steel	14.06*
No. 1 Bundles	14.06*
No. 2 Bundles	14.06*
No. 1 Busheling	14.06*
Machine Shop Turnings	9.06*
Mixed Borings, Turnings	9.06*
Short Shovel, Turnings	11.06*
Chemical Borings	13.06*
Low Phos. Clippings	16.56*
No. 1 Cast	20.00
Clean Auto Cast	20.00
Stove Plate	19.00
Heavy Breakable Cast	16.50

*Inland base ceiling; Boston switching district price 99 cents higher.

PITTSBURGH:

(Delivered consumer's plant)

Railroad Heavy Melting	$21.00
No. 1 Heavy Melt. Steel	20.00
No. 2 Heavy Melt. Steel	20.00
No. 1 Comp. Bundles	20.00
No. 2 Comp. Bundles	20.00
Mach. Shop Turnings	15.00
Short Shovel, Turnings	17.00
Mixed Borings, Turnings	15.00
No. 1 Cupola Cast	20.00
Heavy Breakable Cast	16.50
Cast Iron Borings	16.00
Billet, Bloom Crops	25.0
Sheet Bar Crops	22.50
Plate Scrap, Punchings	22.50
Railroad Specialties	24.50
Scrap Rail	21.50
Axles	26.00
Rail 3 ft. and under	23.50
Railroad Malleable	21.00

VALLEY:

(Delivered consumer's plant)

No. 1 R.R. Hvy. Melt.	$21.00
No. 1 Heavy Melt. Steel	20.00
No. 1 Comp. Bundles	20.00
Short Shovel Turnings	17.00
Cast Iron Borings	16.00
Machine Shop Turnings	15.00
Low Phos. Plate	21.00-22.00

MANSFIELD, O.:

(Delivered consumer's plant)

Machine Shop Turnings	11.00

BIRMINGHAM:

(Delivered consumer's plant)

Billet, Forge Crops	$22.00
Structural, Plate Scrap	19.00
Scrap Rails, Random	18.50
Rerolling Rails	20.50
Angle, Splice Bars	20.50
Solid Steel Axles	24.00
Cupola Cast	20.00
Stove Plate	19.00
Long Turnings	8.50- 9.00
Cast Iron Borings	8.50- 9.00
Iron Car Wheels	16.50-17.00

CHICAGO:

(Delivered consumer's plant)

No. 1 R.R. Hvy. Melt.	$19.75
No. 1 Heavy Melt. Steel	18.75
No. 2 Heavy Melt. Steel	18.75
No. 1 Ind. Bundles	18.75
No. 2 Dlr. Bundles	18.75
No. 3 Galv. Bundles	16.75
Mix. Borings, Sht. Turn.	11.50-12.00
Machine Turnings	11.00-11.50
Short Shovel Turnings	12.00-12.50
Cast Iron Borings	11.50-12.00
Scrap Rails	20.25
Cut Rails, 3 feet	22.25
Cut Rails, 18-inch	23.50
Angles, Splice Bars	22.25
Plate Scrap, Punchings	21.25
Railroad Specialties	22.75
No. 1 Cast	20.00
R.R. Malleable	22.00

(Cast grades f.o.b. shipping point, railroad grades f.o.b. tracks)

BUFFALO:

(Delivered consumer's plant)

No. 1 Heavy Melt. Steel	$19.25
No. 2 Heavy Melt. Steel	19.25
No. 1 Bundles	19.25
No. 2 Bundles	19.25
No. 1 Busheling	19.25
Machine Turnings	14.25
Short Shovel, Turnings	16.25
Mixed Borings, Turn.	14.25
Cast Iron Borings	13.25
Low Phos.	21.75

DETROIT:

(Dealers' buying prices)

Heavy Melting Steel	$17.32
No. 1 Busheling	17.32
Hydraulic Bundles	17.32
Flashings	17.32
Machine Turnings	10.00-10.50
Short Turnings	12.50-13.00
Cast Iron Borings	11.50-12.00
Low Phos Plate	19.82
No. 1 Cast	20.00
Heavy Breakable Cast	13.50-14.00

ST. LOUIS:

(Delivered consumer's plant)

Heavy Melting	$17.50
No. 1 Locomotive Tires	20.00
Misc. Rails	19.00
Railroad Springs	22.00
Bundled Sheets	17.50
Axle Turnings	17.00
Machine Turnings	10.00-10.50
Rerolling Rails	21.00
Steel Car Axles	21.50-22.00
Steel Rails, 3 ft.	21.50
Steel Angle Bars	21.00
Cast Iron Wheels	20.00
No. 1 Machinery Cast	20.00
Railroad Malleable	22.00
Breakable Cast	16.50
Stove Plate	18.00
Grate Bars	15.25
Brake Shoes	15.25

(Cast grades f.o.b. shipping point)

Stove Plate	18.00

CINCINNATI:

(Delivered consumer's plant)

No. 1 Heavy Melt. Steel	$18.50
No. 2 Heavy Melt. Steel	18.50
No. 1 Comp. Bundles	18.50
No. 2 Comp. Bundles	18.50
Machine Turnings	8.50- 9.00
Shoveling Turnings	10.50-11.00
Cast Iron Borings	10.50-11.00
Mixed Borings, Turnings	9.50-10.00
No. 1 Cupola Cast	20.00
Breakable Cast	16.50
Low Phosphorus	21.00-21.50
Scrap Rails	20.50-21.00
Stove Plate	16.00-16.50

LOS ANGELES:

(Delivered consumer's plant)

No. 1 Heavy Melt. Steel	$14.00
No. 2 Heavy Melt. Steel	13.00
No. 1, 2 Deal. Bundles	12.00
Machine Turnings	4.50
Mixed Borings, Turnings	4.00
No. 1 Cast	20.00

SAN FRANCISCO:

(Delivered consumer's plant)

No. 1 Heavy Melt. Steel	$15.50
No. 2 Heavy Melt. Steel	14.50
No. 1 Busheling	15.50
No. 1, No. 2 Bundles	13.50
No. 3 Bundles	9.00
Machine Turnings	6.90
Billet, Forge Crops	15.50
Bar Crops, Plate	15.50
Cast Steel	15.50
Cut Structural, Plate, 1", under	18.00
Alloy-free Turnings	7.50
Tin Can Bundles	14.50
No. 2 Steel Wheels	16.00
Iron, Steel Axles	23.00
No. 2 Cast Steel	15.00
Uncut Frogs, Switches	16.00
Scrap Rails	16.00
Locomotive Tires	16.00

NONFERROUS METAL PRICES

Copper: Electrolytic or Lake from producers in carlots 12.00c, Del. Conn., less carlots 12.12½c, refinery; dealers may add ¾c for 5000 lbs. to carload; 1000-4999 lbs. 1c; 500-999 1½c; 0-499 2c. Casting, 11.75c, refinery for 20,000 lbs., or more, 12.00c less than 20,000 lbs.

Brass Ingot: Carlot prices, including 25 cents per hundred freight allowance; add ¼c for less than 20 tons; 85-5-5-5 (No. 115) 13.00c; 88-10-2 (No. 215) 16.50c; 80-10-10 (No. 305) 15.75c; Navy G (No. 225) 16.75c; Navy M (No. 245) 14.75c; No. 1 yellow (No. 405) 10.00c; manganese bronze (No. 420) 12.75c.

Zinc: Prime western 8.25c, select 8.35c, brass special 8.50c, intermediate 8.75c, E. St. Louis, for carlots. For 20,000 lbs. to carlots add 0.15c; 10,000-20,000 0.25c; 2000-10,000 0.40c; under 2000 0.50c.

Lead: Common 6.35c, chemical, 6.40c, corroding, 6.45c, E. St. Louis for carloads; add 5 points for Chicago, Minneapolis-St. Paul, Milwaukee-Kenosha districts; add 15 points for Cleveland-Akron-Detroit area, New Jersey, New York state, Texas, Pacific Coast, Richmond, Indianapolis-Kokomo; add 20 points for Birmingham, Connecticut, Boston-Worcester-Springfield, New Hampshire, Rhode Island.

Primary Aluminum: 99% plus, ingots 15.00c del., pigs 14.00c del.; metallurgical 94% min. 13.50c del. Base 10,000 lbs. and over; add ½c 2000-9999 lbs.; 1c less than 2000 lbs.

Secondary Aluminum: All grades 12.50c per lb. except as follows: Low-grade piston alloy (No. 122 type) 10.50c; No. 12 foundry alloy (No. 2 grade) 10.50c; chemical warfare service ingot (92½% plus) 10.00c; steel deoxidizers in notch bars, granulated or shot, Grade 1 (95-97½%) 11.00c, Grade 2 (92-95%) 9.50c to 9.75c, Grade 3 (90-92%) 8.50c to 8.75c, Grade 4 (85-90%) 7.50c to 8.00c; any other ingot containing over 1% iron, except PM 754 and hardness, 12.00c. Above prices for 30,000 lb. or more; add ¼c 10,000-30,000 lb.; ½c 1000-10,000 lbs.; 1c less than 1000 lbs. Prices include freight at carload rate up to 75 cents per hundred.

Magnesium: Commercially pure (99.8%) standard ingots (4-notch, 17 lbs.), 20.50c lb., add 1c for special shapes and sizes. Alloy ingots, incendiary bomb alloy, 23.40c; 50-50 magnesium-aluminum, 23.75c; ASTM B93-41T, Nos. 2, 3, 4, 12, 13, 14, 17, 23.00c; Nos. 4X, 11, 13X, 17X, 25.00c; ASTM B107-41T, or B-90-41T, No. 8X, 23.00c; No. 18, 23.50c; No. 18X, 25.00c. Selected magnesium crystals, crowns, and muffs, including all packing screening, barreling, handling, and other preparation charges, 23.50c. Prices for 100 lbs. or more; for 25-100 lbs., add 10c; for less than 25 lbs., 20c. Incendiary bomb alloy, f.o.b. plant, any quantity; carload freight allowed all other alloys for 500 lbs. or more.

Tin: Prices ex-dock, New York in 5-ton lots. Add 1 cent for 2240-11,199 lbs., 1½c 1000-2239. 2½c 500-999, 3c under 500. Grade A, 99.8% or higher (includes Straits), 52.00c; Grade B, 99.8% or higher, not meeting specifications for Grade A, with 0.05 per cent maximum arsenic, 51.87½c; Grade C, 99.65-99.79% incl. 51.62½c; Grade D, 99.50-99.64% incl., 51.50c; Grade E, 99-99.49% incl. 51.12½c; Grade F, below 99% (for tin content), 51.00c.

Antimony: American, bulk carlots f.o.b. Laredo, Tex., 99.0% to 99.8% and 99.8% and over but not meeting specifications below, 14.50c; 99.8% and over (arsenic, 0.05%, max. and other impurities, 0.1%, max.) 15.00c. On producers' sales add ¼c for less than carload to 10,000 lb.; ½c for 9999-224-lb.; and 2c for 223 lb. and less; on sales by dealers, distributors and jobbers add ½c, 1c, and 3c, respectively.

Nickel: Electrolytic cathodes, 99.5%, f.o.b. refinery 35.00c lb.; pig and shot produced from electrolytic cathodes 36.00c; "F" nickel shot or ingot for additions to cast iron, 34.00c; Monel shot 28.00c.

Mercury: OPA ceiling prices per 76-lb. flask f.o.b. point of shipment or entry. Domestic produced in Calif., Oreg., Wash., Idaho, Nev., Ariz., $191; produced in Texas, Ark. $193. Foreign, produced in Mexico, duty paid, $193. Open market, spot, New York, nominal for 50 to 100 flasks; $118 to $120 in smaller quantities.

Arsenic: Prime, white, 99%, carlots, 4.00c lb.

Beryllium-Copper: 3.75-4.25% Be., $17 lb. contained Be.

Cadmium: Bars, ingots, pencils, pigs, plates, rods, slabs, sticks and all other "regular" straight or flat forms 90.00c lb., del.; anodes, balls, discs and all other special or patented shapes 95.00c lb. del.

Cobalt: 97-99%, $1.50 lb. for 550 lb. (bbl.); $1.52 lb. for 100 lb. (case); $1.57 lb. under 100 lb.

Indium: 99.9%, $7.50 per troy ounce.

Gold: U. S. Treasury, $35 per ounce.

Silver: Open market, N. Y. 44.75c per ounce.

Platinum: $35 per ounce.

Iridium: $165 per troy ounce.

Palladium: $24 per troy ounce.

Rolled, Drawn, Extruded Products

(Copper and brass product prices based on 12.00c, Conn., for copper. Freight prepaid on 100 lbs. or more.)

Sheet: Copper 20.87c; yellow brass 19.48c; commercial bronze, 90% 21.07c, 95% 21.28c; red brass, 80% 20.15c, 85% 20.36c; phosphor bronze, Grades A and B 5% 36.25c; Everdur, Herculoy, Duronze or equiv. 26.00c; naval brass 24.50c; manganese bronze 28.00c; Muntz metal 22.75c; nickel silver 5% 26.50c.

Rods: Copper, hot-rolled 17.37c, cold-rolled 18.37c; yellow brass 15.01c; commercial bronze 90% 21.32c, 95% 21.53c; red brass 80% 20.40c, 85% 20.61c; phosphor bronze Grade A, B 5% 36.50c; Everdur, Herculoy, Duronze or equiv. 25.50c; Naval brass 19.12c; manganese bronze 22.50c; Muntz metal 18.87c; nickel silver 5% 26.50c.

Seamless Tubing: Copper 21.37c; yellow brass 22.23c; commercial bronze 90% 23.47c; red brass 80% 22.80c, 85% 23.01c.

Extruded Shapes: Copper 20.87c; architectural bronze 19.12c; manganese bronze 24.00c, Muntz metal 20.12c; Naval brass 20.37c.

Angles and Channels: Yellow brass 27.98c; commercial bronze 90% 29.57c, 95% 29.78c; red brass 80% 28.65c, 85% 28.86c.

Copper Wire: Soft, f.o.b. Eastern mills, carlots 15.37½c, less-carlots 15.87½c; weatherproof, f.o.b. Eastern mills, carlots 17.00c, less-carlots 17.50c; magnet, delivered, carlots 17.50c, 15,000 lbs. or more 17.75c, less carlots 18.25c.

Aluminum Sheets and Circles: 2s and 3s, flat, mill finish, base 30,000 lbs. or more; del.; sheet widths as indicated; circle diameters 9" and larger:

Gage	Width	Sheets	Circles
.249"-7	12"-48"	22.70c	25.20c
8-10	12"-48"	23.20c	25.70c
11-12	26"-48"	24.20c	27.00c
13-14	26"-48"	25.20c	28.50c
15-16	26"-48"	26.40c	30.40c
17-18	26"-48"	27.90c	32.90c
19-20	24"-42"	29.80c	35.30c
21-22	24"-42"	31.70c	37.20c
23-24	3"-24"	25.60c	29.20c

Lead Products: Prices to jobbers; full sheets 9.50c; cut sheets 9.75c; pipe 8.15c, New York; 8.25c, Philadelphia, Baltimore, Rochester and Buffalo; 8.75c, Chicago, Cleveland, Worcester, Boston.

Zinc Products: Sheet f.o.b. mill, 13.15c; 36,000 lbs. and over deduct 7%. Ribbon and strip 12.25c, 3000-lb. lots deduct 1%, 6000 lbs. 2% 9000 lbs. 3%, 18,000 lbs. 4%, carloads and over 7%. Boiler plate (not over 12") 3 tons and over 11.00c; 1-3 tons 12.00c; 500-2000 lbs. 12.50c; 100-500 lbs. 13.00c; under 100 lbs. 14.00c. Hull plate (over 12") add 1c to boiler plate prices.

Plating Materials

Chromic Acid: 99.75%, flake, del., carloads 16.25c; 5 tons and over 16.75c; 1-5 tons 17.25c; 400 lbs. to 1 ton 17.75c; under 400 lbs. 18.25c.

Copper Anodes: Base 2000-5000 lbs., del.; oval 17.62c; untrimmed 18.12c; electro-deposited 17.37c.

Copper Carbonate: 52-54% metallic cu, 250 lb. barrels 20.50c.

Copper Cyanide: 70-71% cu, 100-lb. kegs or bbls. 34.00c f.o.b. Niagara Falls.

Sodium Cyanide: 96%, 200-lb. drums 15.00c; 10,000-lb. lots 13.00c f.o.b. Niagara Falls.

Nickel Anodes: 500-2999 lb. lots; cast and rolled carbonized 47.00c; rolled, depolarized 48.00c.

Nickel Chloride: 100-lb. kegs or 275-lb. bbls. 18.00c lb., del.

Tin Anodes: 1000 lbs. and over 58.50c, del.; 500-999 59.00c; 200-499 59.50c; 100-199 61.00c.

Tin Crystals: 400 lb. bbls. 39.00c f.o.b. Grasselli, N. J.; 100-lb. kegs 39.50c.

Sodium Stannate: 100 or 300-lb. drums 36.50c, del.; ton lots 33.50c.

Zinc Cyanide: 100-lb. kegs or bbls. 33.00c, f.o.b. Niagara Falls.

Scrap Metals

Brass Mill Allowances: Prices for less than 15,000 lbs. f.o.b. shipping point. Add ¾c for 15,000-40,000 lbs.; 1c for 40,000 lbs. or more.

	Clean Heavy	Rod Ends	Clean Turnings
Copper	10.250	10.250	9.500
Tinned Copper	9.625	9.625	9.375
Yellow Brass	8.625	8.375	7.875
Commercial bronze 90%	9.375	9.125	8.625
95%	9.500	9.250	8.750
Red Brass, 85%	9.125	8.875	8.375
Red Brass, 80%	9.125	8.875	8.375
Muntz metal	8.000	7.750	7.250
Nickel Sil., 5%	9.250	9.000	4.625
Phos. br., A, B, 5%	11.000	10.750	9.750
Herculoy, Everdur or equivalent	10.250	10.000	9.250
Naval brass	8.250	8.000	7.500
Mang. bronze	8.250	3.000	7.500

Other than Brass Mill Scrap: Prices apply on material not meeting brass mill specifications and are f.o.b. shipping point; add ¾c for shipment of 60,000 lbs. of one group and ½c for 20,000 lbs. of second group shipped in same car. Typical prices follow:

(Group 1) No. 1 heavy copper and wire, No. 1 tinned copper, copper borings 9.75c; No. 2 copper wire and mixed heavy copper, copper tuyeres 8.75c.

(Group 2) soft red brass and borings, aluminum bronze 9.00c; copper-nickel and borings 9.25c; car boxes, cocks and faucets 7.75c; bell metal 15.50c; babbit-lined brass bushings 13.00c.

(Group 3) zincy bronze borings, Admiralty condenser tubes, brass pipe 7.50c; Muntz metal condenser tubes 7.00c; yellow brass 6.25c; manganese bronze (lead 0.00%-0.40%) 7.25c, (lead 0.41%-1.0%) 6.25c; manganese bronze borings (lead 0.00-0.40%) 6.50c, (lead 0.41-1.00%) 5.50c.

Aluminum Scrap: Prices f.o.b. point of shipment, respectively for lots of less than 1000 lbs.; 1000-20,000 lbs. and 20,000 lbs. or more, plant scrap only. Segregated solids: S-type alloys (2S, 3S, 17S, 18S, 24S, 32S, 52S) 9.00c, 10.00c, 10.50c; All other high grade alloys 8.50c, 9.50c, 10.00c; low grade alloys 8.00c, 9.00c, 9.50c. Segregated borings and turnings: Wrought alloys (17S, 18S, 32S, 52S) 7.50c, 8.50c, 9.00c; all other high grade alloys 7.00c, 8.00c, 8.50c; low grade alloys 6.50c, 7.50c, 8.00c. Mixed plant scrap, all solids, 7.50c, 8.50c, 9.00c; borings and turnings 5.50c, 6.50c, 7.00c.

Lead Scrap: Prices f.o.b. point of shipment. For soft and hard lead, including cable lead, deduct 0.55c from basing point prices for refined metal.

Zinc Scrap: New clippings, old zinc 7.25c f.o.b. point of shipment; add ½-cent for 10,000 lbs. or more; New die-cast scrap, radiator grilles 4.95c, add ½c 20,000 or more. Unsweated zinc dross, die cast slab 5.80c any quantity.

Nickel, Monel Scrap: Prices f.o.b. point of shipment; add ½c for 2000 lbs. or more of nickel or cupro-nickel shipped at one time and 20,000 lbs. or more of Monel. Converters (dealers) allowed 2c premium.

Nickel: 98% or more nickel and not over 1% copper 26.00c; 90-98% nickel, 26.00c per lb. nickel contained.

Cupro-nickel: 90% or more combined nickel and copper 26.00c per lb. contained nickel, plus 8.00c per lb. contained copper; less than 90% combined nickel and copper 26.00c for contained nickel only.

Monel: No. 1 castings, turnings 15.00c; new clipping 20.00c; soldered sheet 18.00c.

Sheets, Strip . . .

Sheet & Strip Prices, Page 190

Sheet demand shows no easing and mills are heavily loaded, with deliveries constantly further extended. Stainless and silicon sheets have been pushed ahead markedly in recent weeks. Generally mills can promise little better than late July and beyond, with some unable to do better than September. Directives are being issued to obtain material urgently needed for war products.

New York — Sheet deliveries are becoming more extended, with practically all grades affected. Specialties, such as silicon sheets and stainless, within the past week have been extended by at least a month in some cases. One producer is now practically sold up for first half on all grades of silicon sheets, this reflecting expanding requirements for radar and other communications equipment.

The general position on hot and cold-rolled sheets appears to be late July and beyond. Certain sellers have nothing available in either grade before September. A tight situation also prevails in narrow hot and cold strip, with little hot strip to be had before September and with at least a couple of large producers sold out for the remainder of the year on narrow cold strip. A new "hut" program requires substantial tonnages of hot strip, as well as hot-rolled sheets.

Boston — High ratio of cold-rolled sheet volume as compared with hot-rolled is due to slightly better deliveries rather than any influence of recent price revisions. This delivery advantage has also been eliminated in some cases by heavier buying. Demand for all grades of sheets is more active. For Massachusetts 1946 automobile license plates 650 tons of No. 22 cold-rolled stock has been placed with L. E. Zurbach Steel Co., Boston jobbers, at 4.95c, including shearing, etc. Deliveries start in June.

Cincinnati — Recent heavy ordering of sheets has augmented backlogs until now delivery promises extend into August on hot-rolled and cold-rolled, and into October on some specialties and little tonnage of galvanized is available before August. With heavy commitments came a decrease, almost a stoppage, of cancellations. Current anxiety of mills is curtailment of transportation facilities, both rail and truck, and a consequent need to store temporarily a considerable proportion of output.

Cleveland — Orders for sheets and strip have leveled off at moderately below the intensive buying pace earlier this month. Hot-rolled pickled sheet deliveries are extended into August, galvanized into November. Production schedules on wide strip are booked through the remainder of this year in some instances. Sharp increase in requirements for landing mats, shell containers, rockets, and corrugated sheets for army barracks, largely account for the heavy demand for flat-rolled products last month. Drum sheet steel also is becoming more critical. Mill carryover is greater than at any time in the past seven months.

Philadelphia—A few producers still can book hot-rolled sheets for July delivery but most quote August and September and on cold-rolled promises range generally from August into October. Inquiries are still being issued for much earlier shipment. Frankford arsenal is in the market for about 19,000 tons of hot and cold-rolled, with deliveries in April to July. Bids were asked on these on an f.o.b. mill basis, shipping orders to follow. Another buyer in this district inquires for 1700 tons, of 18 and 22-gage material for bomb fins, for April shipment. Galvanized sheet schedules are moving ahead. Some tonnage, especially in heavy gages, can be had in August but most promises fall in September or beyond. Some producers are sold for the entire year.

Pittsburgh—Mills are faced by continued shipping difficulties. Far from easing the sheet delivery situation, the freight embargo added to problems of mills which already had been stocking a substantial part of their output. Two large sheet mills in this district were forced to shut down for several days because no cars were available and no room left for storage. New orders on practically all military programs continue to flow in, building up backlogs and complicating future delivery problems.

Chicago—Sheet demand expands and deliveries become more extended. Some congestion is arising from altered specifications for landing mat material. Formerly, the Army and Navy specified 10-gage hot-rolled sheets; now orders call for 10-gage hot-rolled pickled. Because of heavy order volume, mills can not supply pickled before September. Unpickled could be had in May. Change in specification apparently was to obtain better surface in finished mats. First half de-

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mand for landing mats is said to total 480,000 tons; in last half it is expected to drop to 335,000 tons.

Steel Bars . . .

Bar Prices, Page 190

Increased ammunition needs and demands of the aircraft industry are pushing delivery dates on bars further into the future. While small carbon bars still can be ordered for May delivery larger sections are obtainable mainly in third quarter. Delivery needs on some shell contracts are being booked for March, under directives. Alloy bars will be needed for expanded aircraft work, which is expected to give further tightness.

New York — Small carbon bars can still be had in May, although the situation is tightening as a result of a further increase in the small arms and ammunition program. As for medium and large bars, deliveries fall largely in third quarter. Certain producers can offer a variety of larger sizes for July shipment, while others have nothing available before August in some sizes.

Meanwhile, alloy bar shipments are becoming more extended, some producers offering three months on hot-rolled and around five months on cold-drawn material. Improvement is ascribed primarily to aircraft requirements, which cover principally sizes ranging 2 inches and smaller. A particular spurt in these requirements is expected in this district shortly for some aircraft models which are still in the paper stage. At least one or two aircraft builders, who have work in this position, claim that they will probably need shipments beginning in July. With deliveries on alloy bars now extending rather rapidly, it would appear that they will not have much time in which to get their specifications on order, particularly the cold-drawn alloy bars which will be needed.

Boston — Placement of shell contracts has brought out heaviest inquiry ever emanating from New England, including one for 50,000 tons, delivery starting in June at 10,000 tons a month. Shell steel is wanted as early as March on some new contracts, requiring directives. In addition to those previously mentioned as having contracts, some for mortar shells, are: Bancroft & Martin Rolling Mills Co., Portland, Me.; George Lawley & Sons, Neponset district, Boston, and a shop in the Fall River-New Bedford district. Ordnance components also require an increasing volume of bars. Sharp extensions in alloy deliveries are also noted; hot-rolled is well into April, and, if heat-treated, May is the earliest with some producers. Directives to cold-drawers are sustained and jobbers are pressing for tonnage.

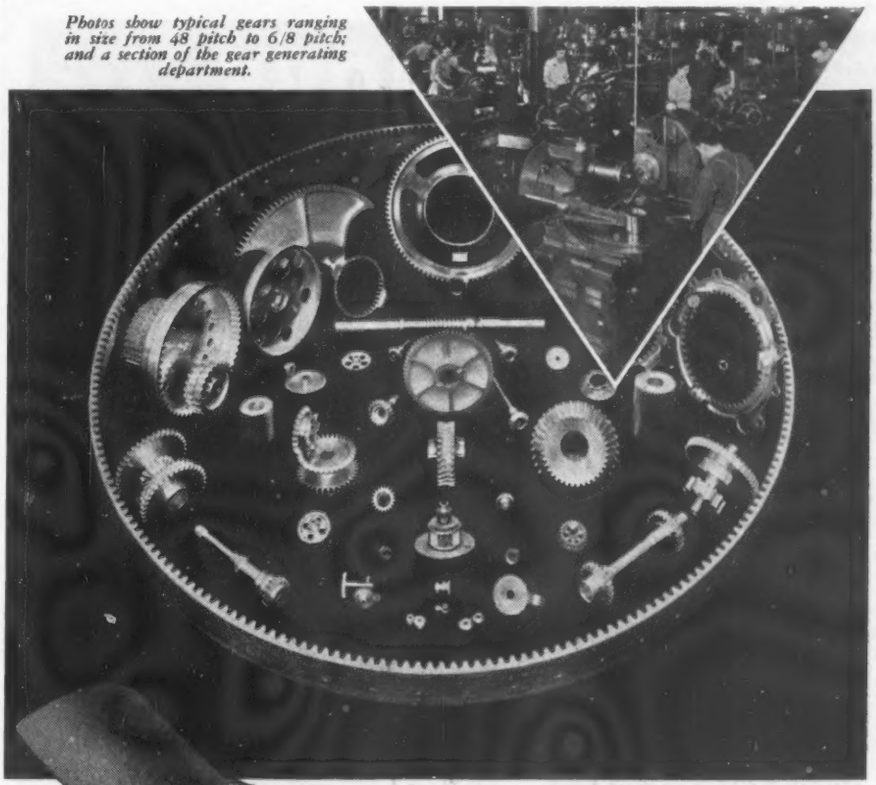
Seattle — Mills are trying to reduce order backlogs but additional orders for war purposes and continued scarcity of skilled labor maintain unfilled orders at about the same level. Merchant bars are in steady demand by shipyards and warehouses, taking practically all production.

Philadelphia — Hot-rolled alloy bars, available just before the turn of the year within 30 to 45 days, now are quoted for May and beyond. Some large producers are virtually sold out for first half. One leading interest still has electric furnace alloys for shipment in May, with nothing in open-hearth trades before August. Silicon sheets and stainless steel have stiffened appreciably. Small carbon bars, both rounds and flats, can be had in June but on larger sizes deliveries extend through third quarter. One large producer has nothing to offer before August on certain sizes nor before September on larger. Gun and ammunition requirements dominate but bars are moving into a diversity of outlets, including railroad and maritime work and an increasing volume of war repairs.

Cleveland — Most of increased bar demand last month represented expanded requirements for the heavy shell, tank and heavy truck programs. Directive tonnage on these programs forces constant revisions on delivery promises for a substantial tonnage of regular CMP orders. An unusually heavy demand for alloy bars developed last month and no let-up is indicated through February. Orders for steel products that can be made on rerolling mills are being shifted whenever possible to relieve crowded schedules. Mill deliveries on large rounds are extended into September, with smaller sizes available in June and alloys in August. Bar flats are being promised for July delivery, with narrower sizes scheduled for June.

Pittsburgh—The situation shows little change, with all mills jammed tight and little capacity left before fourth quarter. Semifinished is a problem although bessemer billets are available, with few takers for bessemer bars. Reshuffling of orders now on books will provide a more equitable distribution and make advance schedules for all mills uniform. Rush placement had left some mills with less commitments than others, con-

Photos show typical gears ranging in size from 48 pitch to 6/8 pitch; and a section of the gear generating department.



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sequently earlier delivery promises could be made. Most sources here believe the rush is over, at least temporarily, and the job again becomes one of meeting delivery promises. Freight embargo caused small loss of bar tonnage here, with one bar mill down for three days.

Chicago—Bar production and deliveries are being markedly affected by impact of the shell program. One barmaker whose commitment on shell steel will average about 40,000 tons a month in first quarter will have an obligation of over 50,000 tons in April. This means a corresponding reduction in hot-rolled bars, semifinished and rails. The carryover already existing in these products will be further aggravated by a reduced directive preventing production of all previously accepted tonnage during the month of validation. Indications are that farm implement makers will return more to war work, thereby cutting into implement output. Tractors are on schedule, but harvesting machinery is running behind.

Steel Plates . . .

Plate Prices, Page 191

Plates are not in as heavy demand as bars and sheets but important tonnages are being placed, with others in the offing, promising better plate demand than was envisioned a few months ago.

Philadelphia—Plate deliveries can be obtained in May and a little sheared tonnage in April. Sun Shipbuilding & Dry Dock Co., Chester, Pa., has placed 13,500 tons of steel, including more than 11,000 tons of plates, for three cargo ships, with steel for seven more to be bought later. Specifications for the entire merchant marine program are increasing, with the peak expected to be reached in March. A further program of 200 merchant ships has been formulated, with little present assurance it will become active. Plate backlogs are expected to be bolstered by requirements for 500 steam locomotives reported tentatively placed by the French provisional government with Baldwin Locomotive Works and American Locomotive Co.

Cleveland — Complete shutdown of Republic Steel Corp.'s strip mill for three days last week, due to shutting off of the gas supply, resulted in a substantial loss of plates and to a less extent sheets. Delivery on Maritime Commission plate tonnage is scheduled by most mills through April. Shipment of plates on this account has held up much better than was expected toward the close of last year. The tank program also is taking more tonnage than earlier schedules called for. Normal seasonal requirements for ship repairs are also a factor in current delivery schedules.

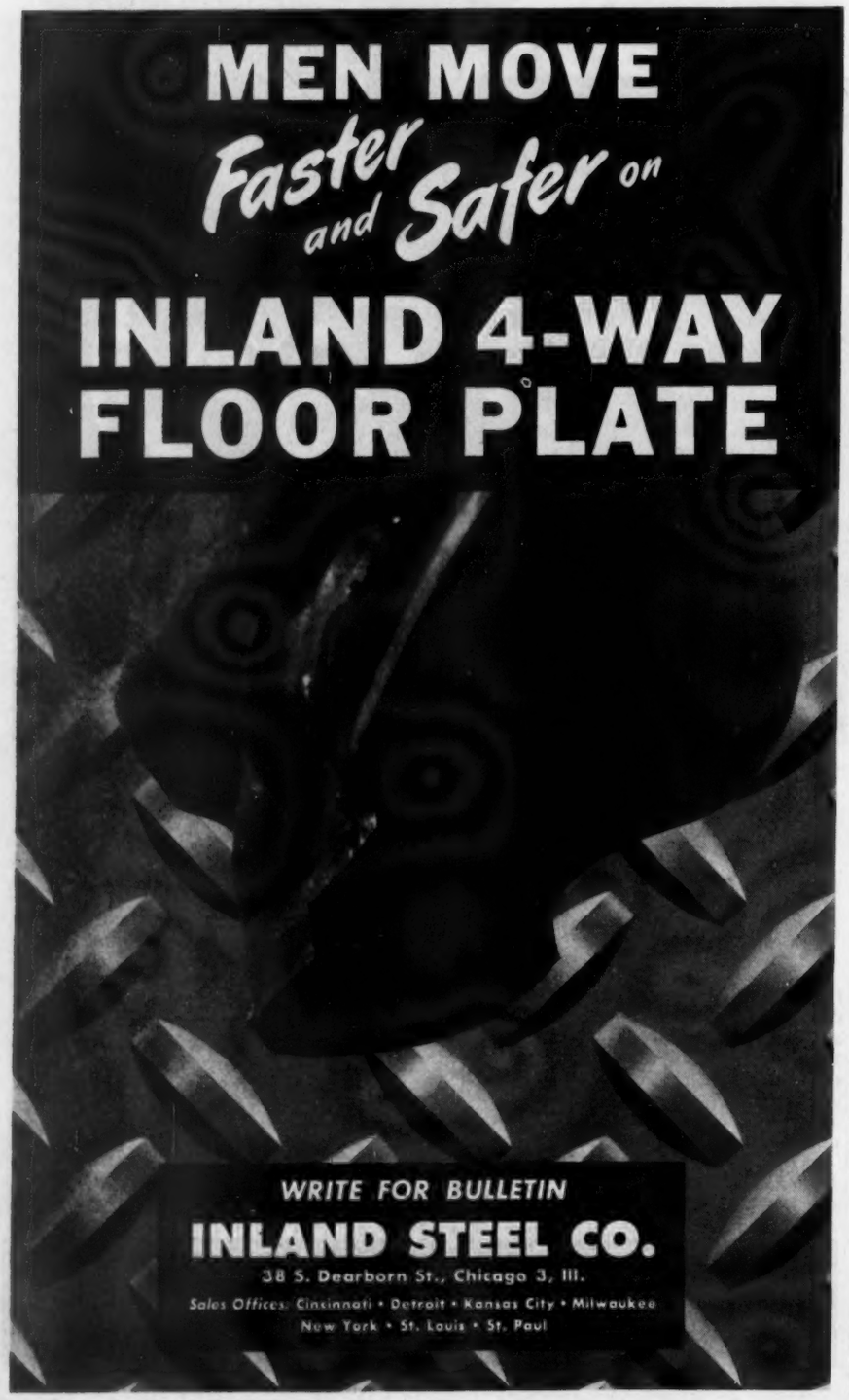
Boston — While plate demand is slightly heavier, shipyards continue to shake down inventories where possible. Bethlehem-Hingham yard is slated to close in August; New England Shipbuilding Co., South Portland, Me., will have depleted backlogs by midsummer and employment at both is tapering. While Hingham was constructed for destroyer escorts, later engaged in landing craft construction, decline in Navy requirements is not likely to approximate the decline in cargo ship building. Walsh-Kaiser, Providence, R. I., has a substantial backlog of combat-loaders and no immediate decline in steel requirements appears likely. Some small yards, including one at Ipswich, Mass., are closing when finished with present contracts.

Tubular Goods . . .

Tubular Goods Prices, Page 191

Boston — Merchant pipe buying centers mainly among distributors, with scattered exceptions. While a Providence, R. I., yard has recently placed substantial orders for pipe and tubing, ship requirements are downward, reflected somewhat in less pressure on prefabricators. Sprinkler volume continues active. Wanted for prompt delivery, 100 tons of 8-inch steel pipe is required for foundations, Wyman-Gordon Co. subsidiary, Millbury Junction, Mass. Demand for seamless tubing is more active, including 52,100 grade for bearing rings. Deliveries extend to July and beyond. Some mill schedules are loaded with oil country orders and producers in some instances are not pressing for additional volume. A Chicopee, Mass., shop is inquiring for heavy-wall cold-drawn seamless tubing for a contemplated 88-mm. shell contract, 700 tons a month starting in May, to produce 100,000 monthly.

Seattle — Demand for cast iron pipe has quickened and several projects are in the field. Dealers report difficulty in obtaining prompt delivery, 60 days being about the minimum. Spokane, Wash., has awarded 250 tons of 6 and 12-inch pipe to Hughes & Co., Spokane, with valves, gates and hydrants to Pacific States Cast Iron Pipe Co. Longview, Wash., has placed an unstated tonnage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of 12 and 16-inch supply line pipe with M. Malaspina, Seattle. King County District 49 has bids for about 150 tons of 4 to 6-inch cast iron pipe. Seattle has received offers for 70,000 feet of galvanized steel pipe.

Pittsburgh—Chief difficulty is obtaining adequate flow of billets for piercing and skelp for welding. Tubing mills are faced by fairly heavy backlogs, yet some units are not operating at capacity, due to manpower shortage on finishing units as well as primary mills which supply semifinished. Oil country goods production is well below demand, and pressure tubing needs again have built up substantial backlogs. Mechanical tubing needs continue steady at high levels. Black pipe tonnage will be heavier in the next two or three quarters because of lack of galvanizing facilities and zinc, shifting some galvanized pipe tonnage to black pipe.

Wire . . .

Wire Prices, Page 191

Wire products for civilian use are being progressively crowded off mill schedules by directives, which absorb output and push CMP tonnage far into the future. Production schedules are under constant revision to accommodate most needed material. Rope and communications wire needs continue heavy. Deliveries now extend well into third quarter and in some cases beyond. Rod deliveries are in September in some cases.

Boston — An increasing volume of CMP orders is forced out of schedule, result of numerous directives. Carryovers from January are heavier and major large-tonnage war programs are further expanded. Orders for tire bead wire are up on directives and one eastern mill is starting production for the first time, this being Washburn Wire Co., New York, with steel and semifinished works at Phillipsdale, R. I. Rods have been allocated another producer under directive. Material will be galvanized by a second shop. Extending well into third quarter and beyond on some items, production schedules, subject to frequent revisions, permit small tonnage for second quarter delivery. Most spring wire specialties fall into third quarter. Rope and various communication wire loads have not eased; additional tonnage is being placed where openings can be found. Rod deliveries are extended to September in some cases, a lengthening of three months in one instance.

New York — Heaviest loads on wire mill facilities are for drawing sizes .023 to .015; in this range are several largest war requirements. Continuing directives for third quarter leave limited openings for even CMP tonnage and more orders taken for that period are tentative, accepted on a basis of available capacity. While more CMP tonnage is crowded out of schedule, some firming directives cover portions of this volume.

Tin Plate . . .

Tin Plate Prices, Page 191

Pittsburgh—There has been no word on probable production schedules for second quarter. First quarter business has been somewhat below expectations and the new rulings affecting tin conservation may have a depressing effect on the second quarter outlook. According to all present indications, there will be less tonnage in the second quarter than the first, which was authorized at 900,000 tons (later reduced to 875,000 tons) despite the fact that under the new ruling on M-81 it is possible to pack many more items in tin. Demand traceable to this revision is scant at the moment.

Rails, Cars . . .

Track Material Prices, Page 191

New York — Denver & Rio Grande Western has closed on 500 fifty-ton box cars to the Pressed Steel Car Co., Pittsburgh. Chicago Great Western on 150 box cars to the Pullman-Standard Car Mfg. Co., Chicago, and the New York Central is expected to announce action shortly on 1000 gondolas on which Despatch Shops Inc., East Rochester, New York, is low bidder. However, in general, there is a tapering in car demand, with carbuilders looking to war developments to determine whether they will be able to get steel on schedule for orders already on books.

The New York Central has applied to the Interstate Commerce Commission for permission to purchase 19 diesel switch engines from the American Locomotive Co., New York, at a cost of $1,140,080.

Reinforcing Bars . . .

Reinforcing Bar Prices, Page 191

Cleveland—Reinforcing bar directives on producers' mills have been cut about

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50 per cent to allow production of other urgently needed war requirements. It is planned to reschedule these orders where possible on rerolling mills to absorb any available open capacity. Producers have been asked to report all open facilities available for rerolling bar shapes and miscellaneous products to further ease the pressure. Lack of rails has been cited as an obstacle in expanding rerolling operations. Some interests believe that a better segregation of scrap would improve the situation, pointing out that many rails now being melted could be used by rerolling mills.

Seattle—Reinforcing bars are of minor importance with mills here. Military agencies are not using this material and minor tonnages are being rolled for civilian projects. An unstated quantity is involved in a nurses' home at Tacoma, Wash., general contract to McDonald Building Co., Tacoma. Trumix Concrete Co., Medford, Oreg., has a contract from the Reclamation Bureau for two pumping plants for the Tule Lake division of the Klamath, Oreg., project, requiring 150 tons of bars and 30 tons of pumps and other metals.

Pittsburgh—There is little new domestic business. Heavy tonnage of export steel for France through lend-lease has been placed with rail mills. WPB now proposes that bessemer billets formerly rolled into reinforcing bar by producing mills, but now prohibited, be turned over to rail mills rolling because there is a shortage of rerolling rails and no market for the bessemer billets. New billet mills are opposing this action, feeling that if anyone is to roll the bars, they should be permitted to do it. Meanwhile, stocks of new billet steel held by contractors are declining with poor prospects of replacement.

Pig Iron . . .

Pig Iron Prices, Page 193

February pig iron buying may be somewhat lighter because of the shorter month and because some melters may have more inventory than allowed by the requirement for only 30 days supply. Weather in the East has delayed shipments and some foundries have been forced to curtail or suspend. Little relief has been afforded foundries in labor supply.

New York — With February a shorter month the pig iron melt should be lighter than in January. However, January production was handicapped by adverse weather conditions, which slowed shipment of pig iron and scrap, and caused a few foundries to suspend operation temporarily and others to curtail sharply.

Manpower has been a retarding factor in output, although this has served more to keep operations from being increased rather than being actually curtailed. This factor is expected to be constant through February, as little relief is in sight and as it is considered probable also that foundries will at least be able to maintain the forces they have.

Buffalo — Supply of cars for loading pig iron has improved and a leading merchant iron seller has received sufficient to move current production and some accumulated stock. Reports are received that several eastern foundries have been forced to curtail or suspend operations because of delayed iron shipments. Restriction of inventory to 30 days is expected to reduce February buying by those carrying larger stocks.

Cleveland — Lack of coking coal and growing labor shortage continue to restrict pig iron production. The supply is steadily growing more critical and some observers believe that allocations soon will be put into effect again. Output of iron in this district was sharply curtailed last week, when Republic Steel Corp. was forced to bank its No. 1, 2, and 5 blast furnaces, and place its No. 4 on three-quarter blast, due to forced banking of most of its 279 coke ovens, as the result of the coal shortage resulting from the rail embargo. However, by the close of last week only the No. 5 unit was idle and all coke ovens were operating.

Boston — With considerable tonnage of pig iron due in January still undelivered from Buffalo, foundry reserves are dangerously low in some instances and consumers are borrowing from nearby stocks. Numerous shipments are on the way, delayed by the transportation tangle. Some additional emergency orders are being filled from stocks at the Everett furnace. Thirty-day limit on inventories will have only slight immediate effect as most consumers are within that limit. February deliveries, weather permitting, are likely to be heavier.

Pittsburgh — The freight embargo backed up steel production to the point

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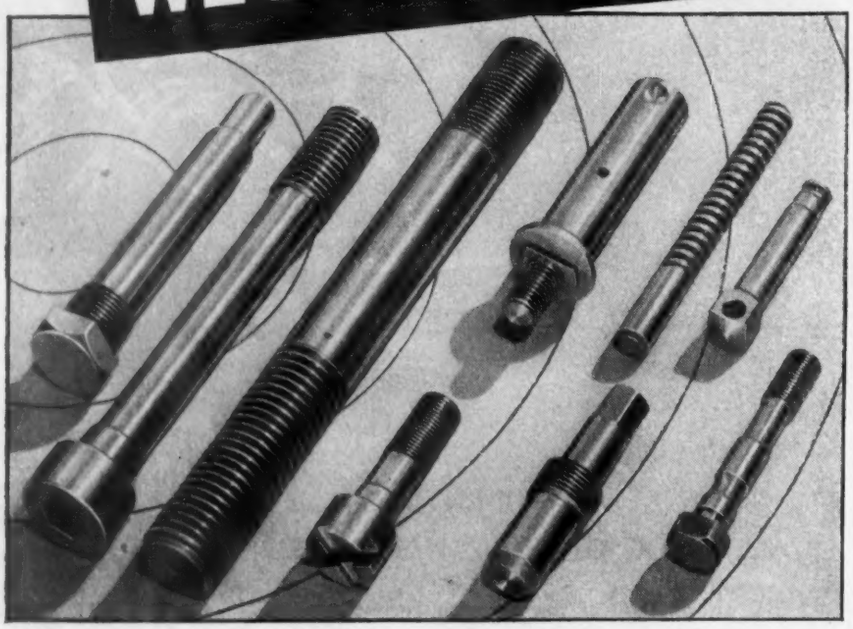

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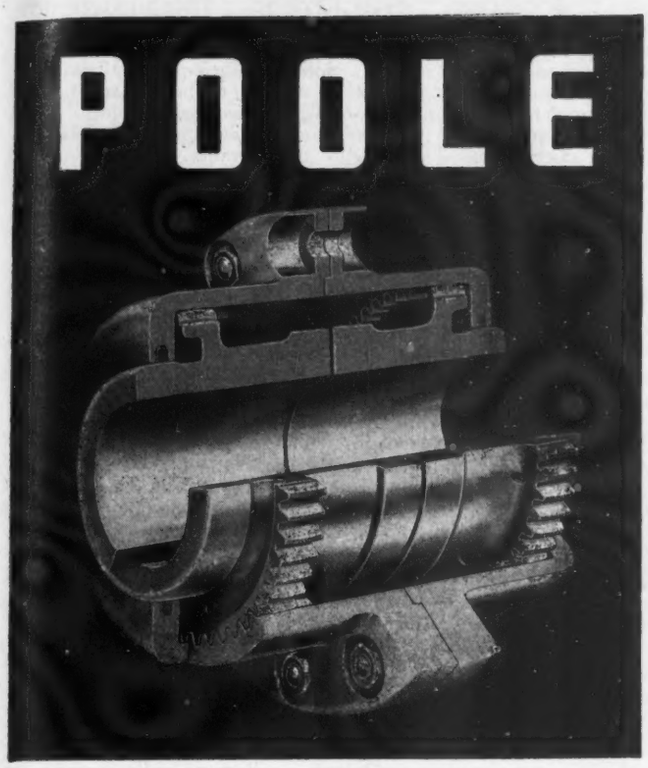

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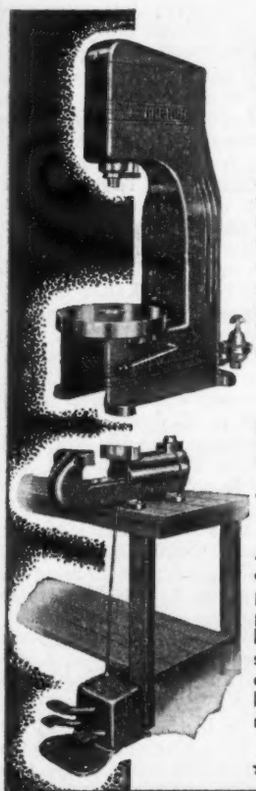

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where some blast furnaces were operating on reduced schedule and shipments of pig iron were held up, thus reducing already slim inventories at some points. The reduction of inventories to a 30-day limit will have little effect on most consumers here. A scattered few have been stocking iron above that limit, but the tonnage involved is slight. Pig iron sellers have been watching distribution, and with a first-hand knowledge of their customers needs, they have been meeting demand with little excess. There is plenty of unsatisfied demand in today's market, but few reports of curtailment of operations due to inadequate supplies of pig.

Chicago—Although the recent freight embargo held up some iron from this district to consumers in the restricted area, no serious hardship is known to have occurred. Inventories were sufficient to satisfy melting requirements. The matter of foundry coke was of more consequence, since stocks were not so large and some of the fuel for district comes from central Indiana. With WPB ordering iron inventories reduced from 60 to 30-days suppliers will be obliged to watch shipments more carefully from here on.

Scrap . . .

Scrap Prices, Page 194

Scrap supply is tightening and steelmakers are using tonnage from reserves, which in some cases have been considerably depleted. Transportation difficulties have added to the shortage and heavy snows have restricted yard operations. Some allocations of railroad and industrial scrap have been made to provide supply at threatened points. Most steelmakers are buying everything offered in their grades. Foundry grades are still the scarcest material.

Buffalo — January scrap shipments were less than half the quantity expected and dealers are attending more to clearing snow from yards than shipping scrap. Rail movement is slow because of weather. Curtailed operations by steel mills have prevented distress from lack of scrap. Dealing is practically at a standstill.

Boston — Restricted movement of scrap to outside mills as a result of the freight embargo has not eased the tight situation materially, with supply of foundry grades still acute. Yard operations still are restricted. Steel mill inventories are lower and district consumers are buying heavy melting steel and short turnings where found, if up to specifications. Allocations of government scrap are frequent and include machine shop turnings offered by Watertown arsenal, but withdrawn from sale. Bids will be taken Feb. 6 on 1415 tons of unprepared heavy melting steel at Holyoke, Mass., and Feb. 8 on 1020 tons at Hingham, Mass.

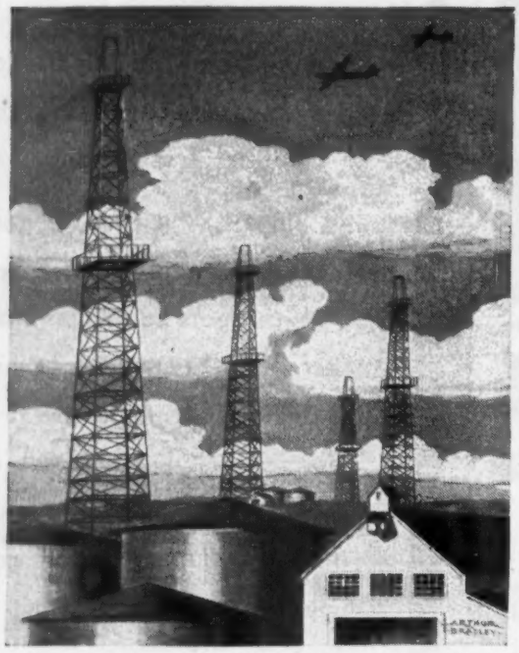
Detroit — Borings and turnings are sentimentally weaker by 50 cents a ton, reflecting jittery feeling by dealers over possible sudden war termination, along with cessation of buying by mills flooded with shipments of scrap ordered last month but held over until 1945 by dealers. Steel grades and electric furnace material hold at ceiling level. Recent rail embargo held up shipments consigned to outside areas, but movement within Detroit switching limits was exempted from the embargo.

Cincinnati — Scrap is tighter than for many months, mainly because weather conditions and the rail embargo have cut down movement. To maintain reserves, melters have been actively taking scrap available at ceiling prices.

Los Angeles — Scrap continues in easy position. Shipyard material is still being sent east on WPB allocation. Heavy melting steel is moving at $14 to $14.50, about $3 under ceiling. Kaiser Co. Inc. has installed equipment, including shears, at its Fontana plant, preparing scrap formerly sent to yards for processing.

St. Louis — Steelmakers in this district are concerned about scrap supply for the next 30 to 45 days. They have been using reserves steadily for some time, as receipts have been less than consumption. Some help is afforded by railroad and industrial scrap, which is being allocated. Snow and lack of manpower have cut deeply into supplies.

Pittsburgh—The so-called zoning distribution will work hardships on some brokers and consumers and will have little effect on others if it is adopted. All consumers here agree that it cannot be adequately studied before decision is rendered, since the deadline set was Feb. 1. There has always been a fairly good flow of scrap from New England here, which would be eliminated under the new plan, and regions with higher freight rates, including some southern states, would be substituted. Some consumers here see neither need for the plan nor value in it, but would prefer to return to the allocation system if some distribution control is



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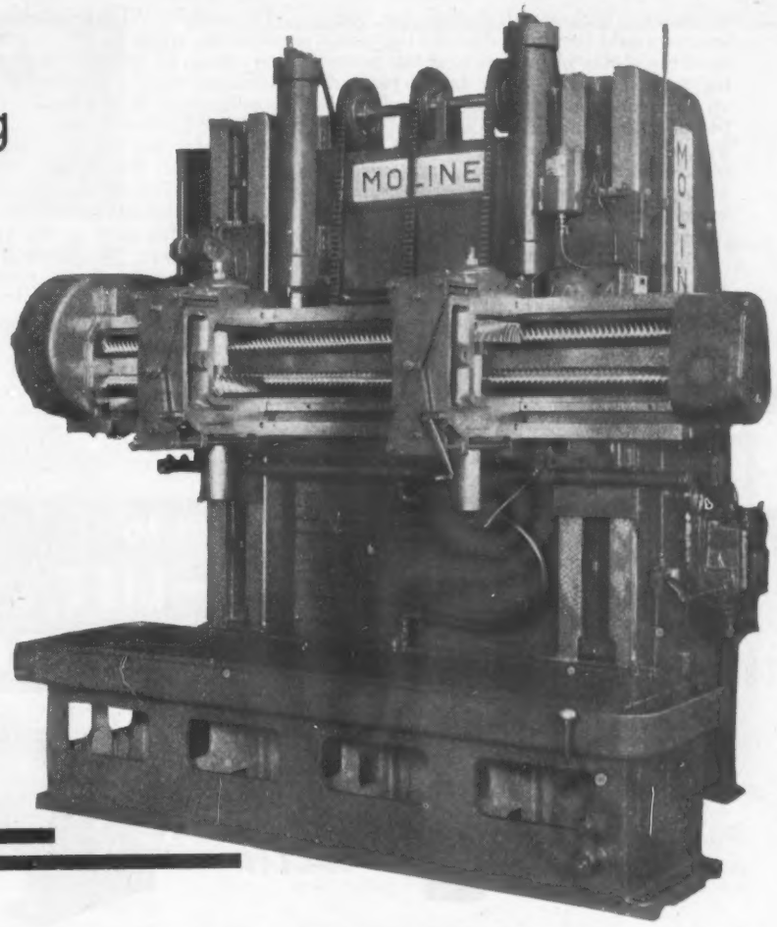

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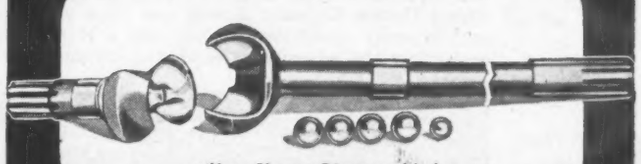

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necessary. Brokers rather than the consumers would be affected under the plan, since the ability of brokers to obtain scrap for mills in many cases has depended on personal contacts and knowledge of the location and availability of scrap. This ability would be lost under the new plan, except in the case of large brokers with nation-wide business, with both sources and consumers in virtually all districts.

Philadelphia—Sellers of scrap expect little early improvement. Weather and labor shortage, with traffic delays are expected to retard shipments and consumer stocks are low. Some trade leaders expect this condition to prevail well into March on steelmaking grades with the outlook in foundry grades even worse.

Proposal by WPB to establish a zoning system in scrap is still tentative. The plan aims to reduce cross-hauling by establishment of 15 zones, to be set up approximately on the basis of $1 springboard for grades quoted on a delivered basis under the OPA formula. Under this proposal Philadelphia district consumers could draw on shipments within a zone including eastern Pennsylvania, possibly as far west as the Susquehanna river, Delaware, New Jersey, New York City and Brooklyn, with some points in the lower Hudson River valley.

Cleveland—First weakness in prices for turnings developed last week since ceiling levels were regained toward the close of last year. The price on turnings in the Chicago and Detroit districts are reported off as much as $2. No sales were made in Cleveland last week, mills refusing to take offerings. However, at Mansfield, O., a sale at $2 below ceiling was reported.

Chicago—Considerable weakness has developed in turnings and borings here within the past week. Prices which two weeks ago were approaching ceilings have dropped $1.50 to $3.25 a ton, under combination of lack of demand and increased production of certain grades as the shell program expands. Some lack of demand comes from bundlers, who up to now have been a strong factor. All major grades of scrap are firm at ceiling, although consumers display considerably less interest.

Warehouse . . .

Warehouse Prices, Page 192

Pittsburgh — Waiting for action on warehouse steel prices by OPA has caused some difficulty in the secondary markets. With an increase imminent, warehouses are hesistant about selling stocks at current prices. However, there is no word yet on the increase, and no guarantee that the increase will be retroactive, so it is difficult to invoice steel for future prices.

Cleveland—Warehouse shipments continue hampered by manpower shortage and lack of adequate trucking facilities. In almost every instance warehouses are from 7 to 10 days behind on delivering items requiring cutting and shearing. Increasing demand resulting from extended mill delivery has intensified the steel distributors' position. Warehouse stocks are moderately below that of six months ago, reflecting upturn in demand and difficulty in getting material from mills.

Philadelphia—Jobbing demand is highly active, a leading warehouse reporting January business above the average for 1944. Weather conditions and labor shortage have retarded deliveries. One jobber asserts mill shipments in January were about half those expected.

Cincinnati — Warehouse demand is well sustained, a feature being an increase in individual orders. Light plates are a bit easier, possibly a reflection in cutbacks, for this district, on some military programs. Structural steel is virtually unobtainable, although most other steel has been coming in from mills in fair quantities.

Los Angeles — Warehouses are receiving increasing orders for plates and hot-rolled strip from military procurement, for landing mats. Much of this now comes from eastern mills because stocks are low. Since the first of the year sales have been greater than mill shipments and stocks are depleted.

Steel in Europe . . .

London — (*By Radio*) — Increasing demand for sheet bars and billets is evident in Great Britain but finished steel products are slower. Plates, particularly, are in less demand. Tin plate makers are booked completely to the end of March.

Metallurgical Coke . . .

Coke Prices, Page 191

Pittsburgh — The freight embargo caused some difficulty in the coal and coke situation, particularly since the industry was suffering from an acute car shortage before the embargo started. In-

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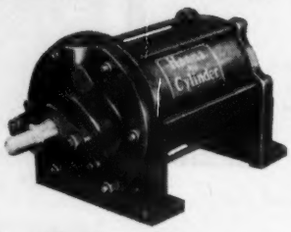

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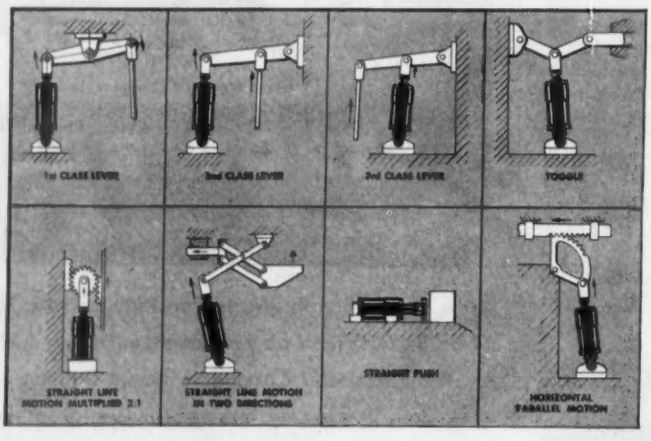

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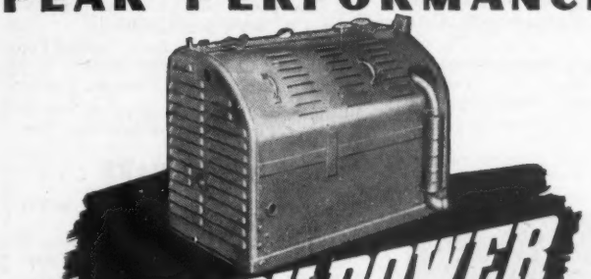

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dustry spokesmen warn that conditions may get worse from now on unless there is a break in the weather and a more regular flow of cars is available at mines and ovens. Stocks held by industry here vary from about 90 days at some power plants to three or four days at some coke ovens. The whole coke situation at the moment is the most serious problem confronting industry, and thus far no solution has been advanced.

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1500 tons, addition to ordnance plant, W. F. & John Barnes Co., Rockford, Ill., to Rock Island Bridge & Iron Works, Rock Island, Ill.; A. L. Jackson Co., Chicago, contractor.

450 tons, infirmary, Rocky Hill, Conn., to Bethlehem Steel Co., Bethlehem, Pa.

350 tons, bridge over Pee Dee river, for state highway department, Columbia, S. C., to Nashville Bridge Co., Nashville, Tenn.

340 tons, building for Easton Foundry Co., Easton, Pa., to Belmont Iron Works, Eddystone, Pa., through Wigton-Abbott Corp., Plainfield, N. J.

110 tons, evaporator plant, Spring Grove, Pa., to Lehigh Structural Steel Co., Allentown, Pa., through Widdicomb Engineering Co., Philadelphia.

STRUCTURAL STEEL PENDING

1300 tons, plant, Goodrich Tire & Rubber Co., Tuscaloosa, Ala.

1000 tons, forge shop building, Lowell, Mass., to be operated by United Shoe Machinery Corp., Boston.

900 tons, for paper mill, Mexico.

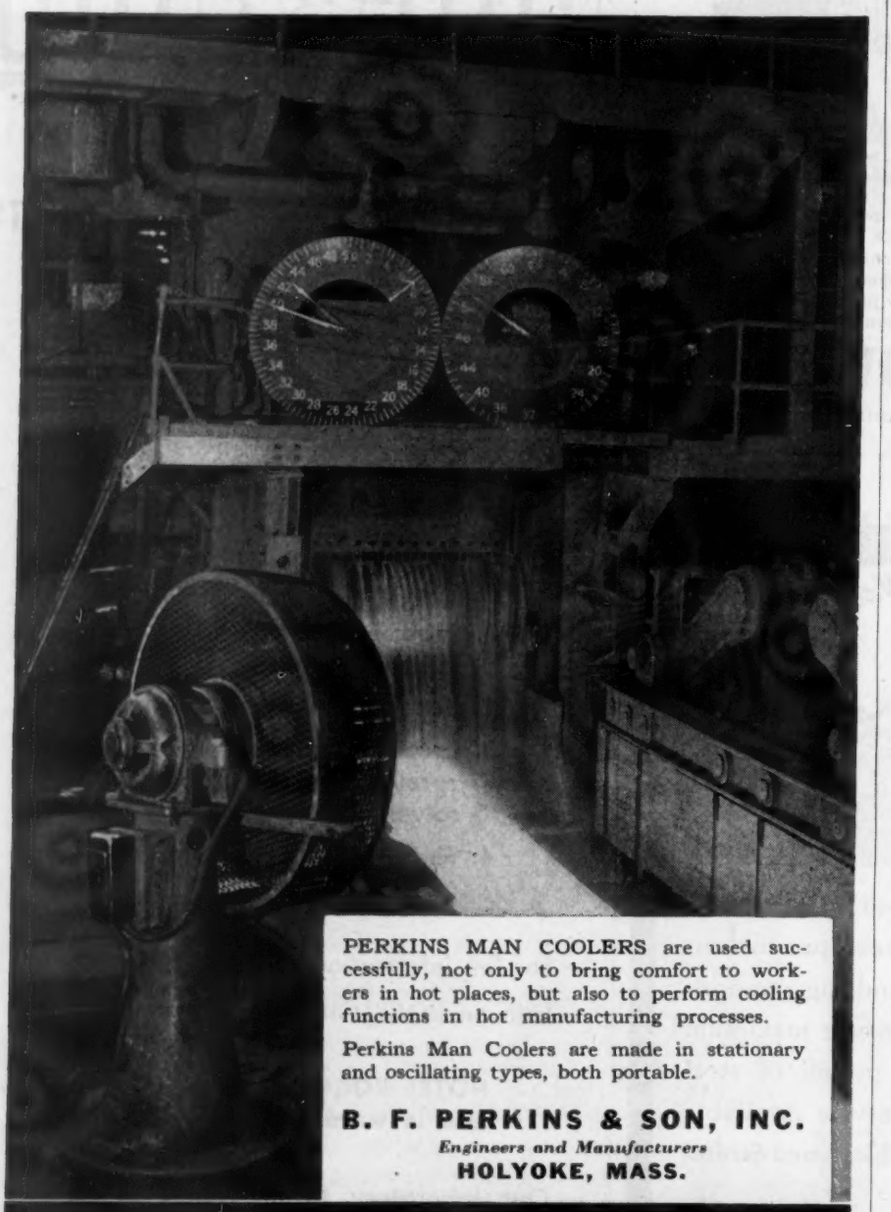
300 tons, building for Personal Products Co., North Brunswick township, New Jersey.

234 tons, storage warehouse, Hammond, Ind., for DPC, general contract to Carroll Construction Co., Chicago; bids Jan. 18.

215 tons, potato chip plant for Wise Delicatessen Co., Berwick, Pa.; bids in.

200 tons, sheet piling, dock, Central Cold Storage Co., Chicago; Fitz Simons & Connell Dredge & Dock Co., Chicago, contractor.

100 tons, addition to hospital at New Rochelle, N. Y.; Turner Construction Co., New York,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REINFORCING BARS . . .

REINFORCING BARS PLACED

481 tons, bridge over Verdigris river, Wagoner county, Oklahoma, to Sheffield Steel Corp., Kansas City, Mo., through Robberson Steel Co.

400 tons, ordnance plant, for W. F. & John Barnes Co., Rockford, Ill., to Truscon Steel Co., Youngstown, O.; A. L. Jackson Co., Chicago, contractor.

357 tons, bridge over Arkansas river, Wagoner county, Oklahoma, to Sheffield Steel Corp., Kansas City, Mo., through Robberson Steel Co.

150 tons, pumping plant and structures, Klamath, Oreg., irrigation project; Trumix Concrete Co., Medford, Oreg., general contractor.

118 tons, roadway and bridge, near Miami, Okla., Oklahoma State Highway commission, to Sheffield Steel Corp., Kansas City, Mo., through Robberson Steel Co.

Unstated, Mountain Home, Idaho, project, to Columbia Steel Co., low at $11,497.

REINFORCING BARS PENDING

400 tons, Long Horn Ordnance plant, Marshall, Tex.

250 tons, Kingsbury Ordnance plant, Kingsbury, Ind.

200 tons, nurses' home, Missoula, Mont.

200 tons, building, International Printing Co., Chicago; bids Feb. 3.

125 tons, Central Kansas Cooperative association, Great Bend, Kans.

PIPE . . .

CAST IRON PIPE PLACED

300 tons, centrifugal, 16 and 8-inch, Hartford, Conn., to Warren Pipe Co., Everett, Mass.

250 tons, 6 and 12-inch, for Spokane, Wash., to Hughes & Co., Spokane.

CAST IRON PIPE PENDING

150 tons, 4 and 6-inch; bids in to district 68, Seattle.

RAILS, CARS . . .

RAILROAD CARS PLACED

Chicago Great Western, 150 box cars, to Pullman-Standard Car Mfg. Co., Chicago.

Denver & Rio Grande Western, 500 fifty-ton box cars, to Pressed Steel Car Co., Pittsburgh.

New York Central, 1000 gondolas, to Despatch Shops Inc., East Rochester, N. Y.

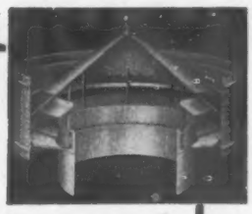
RAILROAD CARS PENDING

Canadian National, 30 passenger coaches; bids asked.

Chicago, Rock Island & Pacific, 500 box cars; bids asked.

Army Transportation Corps, 5000 flat cars for export; bids Feb. 5.

BURT HAS THE ANSWER TO ALL YOUR VENTILATING PROBLEMS!



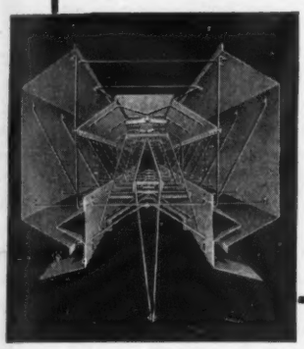
The complete BURT line of gravity, fan and continuous ridge ventilators includes a type and size to put air to work most efficiently for your specialized needs. Standard types are quickly available or special units can be manufactured to your own specifications if required.

Remember too, that BURT'S engineering skill and experience of more than half a century in designing and building ventilators is available to you, without obligation—anytime. See Sweet's or write for catalogs and data sheets.

BOTTOM LEFT—BURT'S Monovent Continuous Ridge Ventilator harmonizes with building lines and exhausts a large volume of air along its entire length. Gravity ventilator efficiency at lower cost.

TOP RIGHT—BURT Standard Gravity Ventilators are engineered to do a remarkable air-moving job at moderate prices. Long-lived, trouble-free and easily installed.

CENTER RIGHT—BURT Free-Flow Fan Ventilators for positive, controlled action. Discharge is vertically upward—away from the roof.



Buy War Bonds to "Ventilate" the Japs—

THE BURT MFG. CO.
ROOF VENTILATORS • OIL FILTERS
EXHAUST HEADS
400 So. High St., Akron 11, Ohio

SEND FOR CATALOGS
Burt Engineers are glad to help on plans

MERRILL BROTHERS
NEW DROP FORGED
VOLZ PLATE-LIFTING CLAMPS
Now Give You More
- STRONGER HOLD!
- GREATER LIFTING POWER!
- QUICK RELEASE!
- PLUS GREATER PLATE-HANDLING RANGE FROM 0" THICKNESS UP.

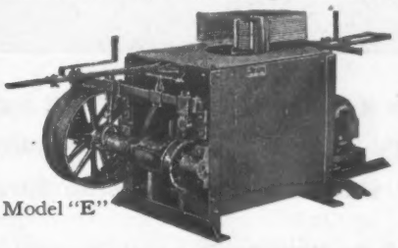
Designed for: "Come-alongs" on welded assemblies; lifting oil and ash barrels and other metal barrels or box containers; lifting large stamped tank heads or tops; angles and structural assemblies. Drop forged completely in ½-ton, 1-ton, and 8-ton capacities.

Bulletins and Prices on Request

MERRILL BROTHERS
56-20 Arnold Ave., Maspeth, New York

KARDONG STIRRUP BENDER

This bender is the result of our 30 years experience in the manufacture of reinforcing bar benders. One man can easily bend 300 four bend stirrups an hour. This bender is also a very practical bender for light slab bars and miscellaneous bending. Write for catalog of our complete line of reinforcing bar benders.



Model "E"

KARDONG BROTHERS, INC.
MINNEAPOLIS, MINN.

WELDED PRODUCTS FROM OPEN HEARTH AND ALLOY STEELS

Pressure Vessels . . . Galvanizing Kettles . . . Annealing Covers . . . Tin Pots . . . Salt Annealing Pots . . . Wire Annealing Pots . . . and Special Plate Work.

National
ANNEALING BOX COMPANY
Pledged to Quality Since 1895
WASHINGTON, PENNA.

API CODE
ASME U-68 U-69
STRESS RELIEVING
X-RAY TESTING

Excessively Heavy Snow Snarls Transportation

(*Concluded from Page 84*)

freight within the Detroit switching limits enabled most plants to maintain production, although there was some shifting of schedules, and one plant was forced to lay off 4000 for a brief period. There has been a considerable piling up of finished war goods which has caused concern, principally from a worker morale standpoint. Local ordnance officials have issued statements to workers in plants that these tieups are the result of weather conditions and not diminished needs.

On the score of maintenance, both rail and truck equipment is requiring increasing attention, and trucks appear to be causing the major concern, since railroad car and locomotive maintenance is somewhat simpler than truck repairs, and older experienced crews are still available where younger truck mechanics may have left for service. Replacement parts for truck engines, transmissions and axles, are in short supply and needs are mounting.

Chicago district suffered in only a minor way from the recent rail embargo. The Chicago switching district was excluded from the embargo zone, steel plants and other war producers were free from any of the provisions of the embargo. Chief effect was the holding back of coking coal shipments from eastern mines.

Normally a good volume of finished steel shipments from the Chicago area goes north, west and southwest, and these shipments were free to move. In some instances, mills revised schedules to roll only material that could be shipped to the unrestricted areas.

In New England, steelworks supplies of pig iron and scrap are lower, but production is not immediately endangered. With some foundries, the situation is fairly serious. Fuel shortages are causing few industrial curtailments. Some additional fuel oil for industrial use is trickling in and distributors are about one week ahead of demand. Coal supplies in spots are down to 10 to 15 days' supply.

While the embargo has eased freight congestion at Philadelphia to some extent, the stringency in pig iron, coal, coke and fuel oil continues pronounced. Coal supply is particularly acute as it affects pig iron production. Some producers have less than two weeks' supply on hand.

The outlook for coal is considered far from promising, especially with contracts between the miners and operators coming up for renewal March 31. Operators believe the miners should present their demands well in advance of the contract expiration date to enable a settlement before the deadline falls. In fact, operators believe the government should press the miners on this point, pointing out that negotiations probably will be between the miners and the government anyway, rather than between the miners and operators.

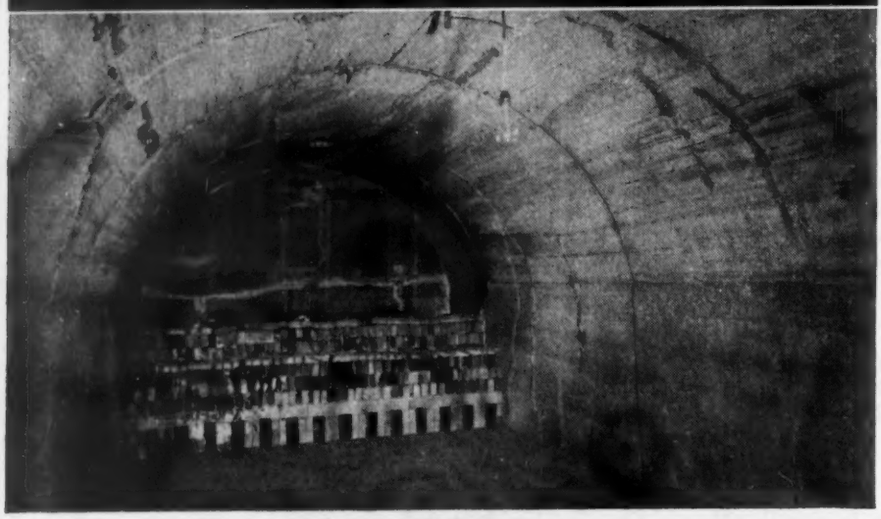
In southern Ohio, finished steel is being stocked. Considerable of this tonnage normally moves by truck, and icy roads and other traffic hazards have slowed down this movement. The coal shortage in this area has not become acute, as a considerable tonnage is carried by river barges.

Southern and western plants were little affected by the weather and the freight embargo. Birmingham plants were somewhat inconvenienced by a stoppage of shipments from subcontractors in the embargoed area, but otherwise were unaffected.

Labor Board Panel Backs Foremen's Demands

Special War Labor Board panel last week recommended that 12 large corporations be ordered to establish grievance machinery for their foremen and supervisory employes. The proposal, if adopted, would partially circumvent the National Labor Relations Board policy which refuses to order employers to recognize or bargain with foremen's unions.

It's easy to use Refractory Concrete!



Here's how a new periodic kiln was built by casting Refractory Concrete between remains of an old wall and a new inside form.

FOR THE SIDE WALLS, a simple inside form was built and Refractory Concrete was placed between the form and the old brick wall. A new sprung arch of Refractory Concrete was then cast in place to form the roof.

Making the Refractory Concrete was also a simple matter. Old firebrick were crushed to proper size and grading for aggregate; then the aggregate was mixed with **LUMNITE** and water. The stiff mixture was cast and tamped into place—not rammed. There was no cutting and trimming; no special shapes were required.

This simplicity of construction spells economy, especially when your rebuilding can be done with plant forces. Besides, it's a quick way to do the job. Aside from the formwork, all you need is **LUMNITE** and the crushed-firebrick aggregate. After the Refractory Concrete is in place, it is ready for heat within 24 hours.

For information on Refractory Concrete and Refractory *Insulating* Concrete, write The Atlas Lumnite Cement Company (United States Steel Corporation Subsidiary), Dept. S, Chrysler Bldg., New York 17, N.Y.

LUMNITE FOR REFRACTORY CONCRETE

WAR IS A JOB FOR specialists

● Producing war needs or fighting a war requires years of intensive training and experience in doing one thing only —and doing it well.

Wickwire Brothers, Inc. have spent more than 70 years in doing one thing—perfecting the manufacture of wire and wire products—and have done it well.

Today, that accumulated knowledge and experience is helping us supply many of the wire requirements of the armed forces. The manufacture of special wire, to help protect electrical cable on board fighting ships, is only one of our wartime jobs. Tomorrow that specialized knowledge of wire making and weaving will be available for solving all kinds of wire problems.

LIFE AT SEA does things to a ship's electric cable, and tough, finely-drawn, corrosion-resistant steel wire, woven in a special basket-weave pattern, protects cable—giving it strength with flexibility to "take it."

WICKWIRE IS WARWIRE

WICKWIRE BROTHERS, INC.
CORTLAND, N. Y.

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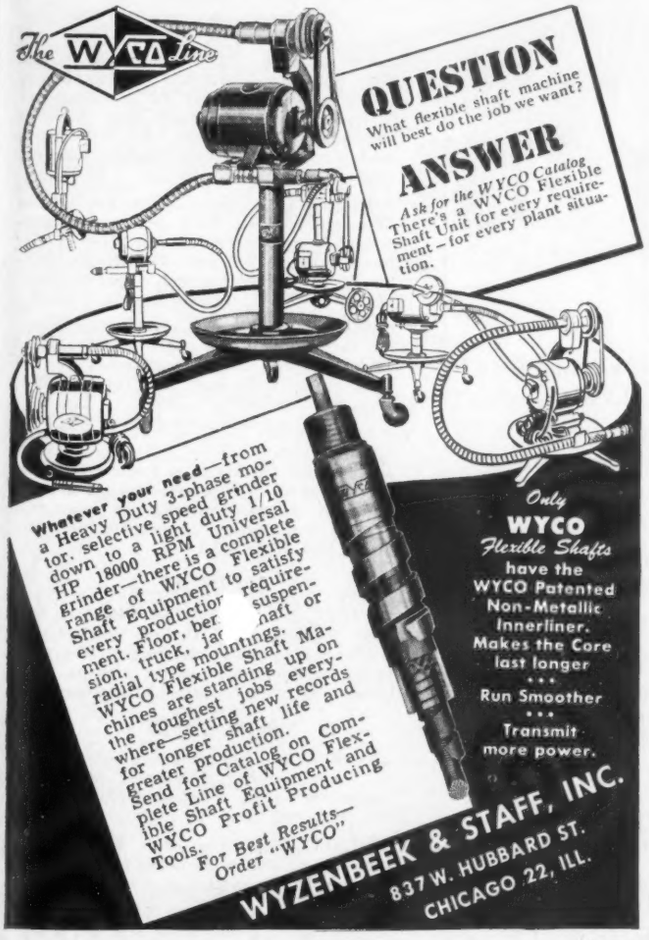
WIRE • SCREEN WIRE CLOTH • POULTRY NETTING • NAILS


The WYCO Line
QUESTION
What flexible shaft machine will best do the job we want?
ANSWER
Ask for the WYCO Catalog. There's a WYCO Flexible Shaft Unit for every requirement—for every plant situation.
Whatever your need—from a Heavy Duty 3-phase motor, selective speed grinder down to a light duty 1/10 HP 18000 RPM Universal Grinder—there is a complete range of WYCO Flexible Shaft Equipment to satisfy every production requirement. Floor, bench, suspension, truck, jack shaft or radial type mountings. WYCO Flexible Shaft Machines are standing up on the toughest jobs everywhere—setting new records for longer shaft life and greater production. Send for Catalog on Complete Line of WYCO Flexible Shaft Equipment and WYCO Profit Producing Tools.
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Only WYCO Flexible Shafts have the WYCO Patented Non-Metallic Innerliner. Makes the Core last longer
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Run Smoother
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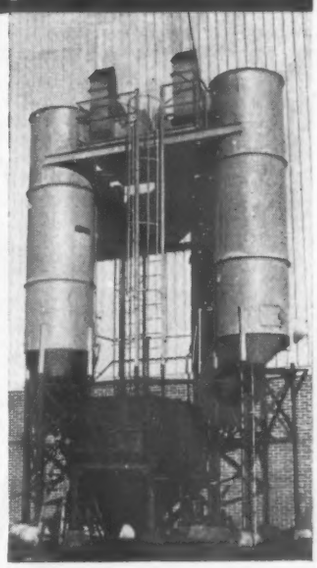
WYZENBEEK & STAFF, INC.
837 W. HUBBARD ST.
CHICAGO 22, ILL.

Dust and Fume Elimination Boosted Employee "Morale"

at this major aircraft plant



Hard-to-control dusts from the abrasive blast cleaning department of this large southwestern aircraft plant are completely collected and converted into harmless sludge, which is readily disposed of by two 8,000 c.f.m. Schneible Multi-Wash Dust and Fume Collectors, shown above in the background.

Other cleaning, pickling and plating operations are thoroughly ventilated by two 7,000 c.f.m. Schneible units shown at the right. Note the twin recirculating and dewatering tank serving both collectors. Accumulated sludge can readily be raked into a truck for disposal.

You can reduce labor turnover, maintain a cleaner plant and lower absenteeism due to unfavorable working conditions, by properly controlling dust and noxious fumes as only the Schneible Multi-Wash System does it! Send for literature.

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Offices in Principal Cities

SCHNEIBLE

CONSTRUCTION AND ENTERPRISE

OHIO

AKRON, O.—Bridgewater Mfg. Co., 219 East Miller avenue, will build a plant to produce hydraulic cylinders and parts for aircraft. Cost will be about $39,000. This is in addition to a 64 x 100-foot addition costing $27,000, recently undertaken.

CLEVELAND—Electronic Research & Mfg. Co. has been incorporated with $500 capital and 200 shares no par value to manufacture and develop electrical, chemical and mechanical products. George H. Lister, 1814 East Fortieth street, is agent for the incorporators.

CLEVELAND—Impression Tool & Mold Co. has been incorporated with $2000 capital and 200 shares no par value to deal in machinery, machine tools and appliances. Lawrence G. Knecht, Williamson building, is agent.

CLEVELAND—Taylor Chemical & Mfg. Co., 1299 Parsons court has been incorporated by E. R. Taylor, president of Taylor Precision Mfg. Co., same address, to manufacture articles of metal and plastics.

CLEVELAND—Euclid Case Plant division of Chase Brass & Copper Co. Inc. has received WPB approval for construction of an addition to compressor building, 23 x 42 feet and installation of equipment, degreasers, washing machine, tools, automatic chucking machines and pickling machines, to cost about $317,000, expiring April 1, 1945.

WE haven't put it in a book—but the new experience we've acquired in these war production years would probably fill one. This new knowledge added to past know-how will be ready to give you an even better Accurate service on all types of precision springs and wireforms. Carefully controlled manufacture, modern equipment, skilled personnel, broad experience . . . plus engineering that has managed to find better, faster, economical ways of producing both intricate and ordinary jobs . . . These are the advantages that Accurate offers as a source of supply for the springs you will need in the postwar era.

SPRINGS
WIREFORMS
STAMPINGS

Accurate Springs

Send for your copy of the new Accurate Spring Handbook. It's full of data and formulae which you will find useful. No obligation, of course.

ACCURATE SPRING MANUFACTURING CO.
3823 West Lake Street, Chicago 24, Illinois

CLEVELAND—Sloan Machine Products Co., formerly Sloan Machine Co., has been incorporated by Walter L. Sloan, president, with $6000 capital and 250 shares of $100 par value. Engaged on war work, the company plans a new and larger plant when materials are available.

CLEVELAND—Linderme Tube Co., 1509 East 219th street, Euclid, O., Ernie Linderme Sr., president, is preparing plans for a 60 x 180-foot factory building and 25 x 120-foot machine shop, equipped with three-ton crane runway.

GREENVILLE, O.—American Aggregate Co. has received WPB approval of a plant addition and installation of equipment for production of 90 mm shells, to cost about $647,000, expiring July 31, 1945.

MENTOR, O.—Monroe Distributing Co., 1695 Mentor avenue, has been incorporated with $500 capital and 250 shares no par value to deal in electric motors and devices, by Roy L. Monroe and associates.

MIDDLETOWN, O.—American Rolling Mill Co. has received WPB approval for construction of two mill buildings for use by galvanizing department, costing $1,191,500, expiring August 31, 1945.

NORWALK, O.—B. L. McClure, of B. L. McClure Inc., Greenwich, O., has bought a building on Prospect street and will establish a plant for manufacture of machine parts for defense work.

SALEM, O—Salem Engineering Co. has given WPB approval for installation of a rolling mill, billet flamecutting equipment, welding machine, hydraulic descaler, welding booths, etc., at Lebanon, Pa., for production of rocket forgings, to cost $224,275, expiring June 30, 1945.

STEUBENVILLE, O.—Steubenville Stamping Co. has been incorporated with $14,500 capital and 300 shares of $100 par stock to design and manufacture dies for metal fabrication. Harry B. Chellfat, National Exchange Bank building, is agent.

PENNSYLVANIA

BEAVER FALLS, PA.—Babcock & Wilcox Tube Co. has received WPB approval for an addition 125 x 228 feet and installation of heating furnace, loading rack, traveling crane, etc., for production of seamless steel tubing, to cost $250,000, expiring June 30, 1945.

CONSHOHOCKEN, PA.—Lee Rubber & Tire Corp. has received WPB approval for additional steam generating facilities, power transformers, switch gear, boilerhouse, addition to mixer building and dipper building, to cost $867,120, expiring Aug. 1, 1945.

PITTSBURGH—Jones & Laughlin Steel Corp. has been given WPB approval for making changes to two boilers, installation of coal bins, conveyors, air ducts, etc., costing $450,000, expiring June 30, 1945.

WILLIAMSPORT, PA. — Aviation Corp., Spencer Heater division, has received WPB approval for alterations to foundry building, erection of new compressor building and installation of new equipment for production of gray iron castings, to cost $612,784, expiring June 30, 1945.

ILLINOIS

MATTOON, ILL.—Gar Wood Industries Inc., 7924 Riopelle street, Detroit, has bought a site here for postwar construction of a plant to manufacture road-building scrapers, truck bodies and other construction machinery.

WISCONSIN

ALGOMA, WIS.—Algoma Foundry & Machine Co., manufacturer of hammer mills, feed cutters, etc., plans a one-story foundry addition 75 x 100 feet.

APPLETON, WIS.—Fox River Boiler Works plans an addition to its boiler factory. E. A. Wettengel is architect.

BELOIT, WIS.—Fairbanks, Morse & Co. has let contract to Cunningham Bros. for a one-story diesel engine factory 80 x 200 feet.

. . . all types and forms; any material, any quantity—made to your specifications, including heat-treating, spot welding, and tapped assemblies.

1905 1945

Send in your specifications or prints for quotations or ask for suggestions on Parts Like These for application to your products.

M. D. HUBBARD SPRING COMPANY
425 Central Avenue
Pontiac 12, Mich.

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SPRINGS • STAMPINGS
WIRE FORMS
WASHERS • COTTERS

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PRK-33
COBALTCROM

Air Hardening, Non-Deforming,
Cobalt High-Carbon,
High Chromium Steel

A tool steel with an original basic formula of our own specifications. Recognized for long die life and unsurpassed quantity production runs.

Outstanding characteristics are simplicity of treatment, uniform hardness penetration to the center, secondary hardness, extremely high tensile strength, resistance to abrasion.

Ideal for blanking, drawing, forming, trimming and shearing tools.

Furnished in Bar Stock, Billet, Forging, Casting and Welding Rod.

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highest grade tool steels
1260 W. FOURTH ST. CLEVELAND 13, OHIO

ERDLE
PERFORATED
SHEET METALS

ORNAMENTAL—INDUSTRIAL

For All Purposes
66 Years of Metal Perforating
Prompt Shipments
Send for Metal Sample Plates

THE ERDLE PERFORATING CO.
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TAYLOR-WILSON STRAIGHTENING MACHINE

for
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For Round Bars and Tubing

Faster production, constant accuracy.

TAYLOR-WILSON MFG CO.
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PITTSBURGH DISTRICT

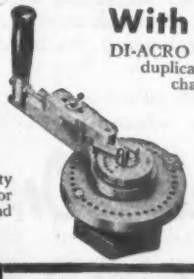
A CENTERED EYE IN 1 OPERATION

DI-ACRO IS PRONOUNCED DIE-ACK-RO

Precision CENTERED EYE Bending

The DI-ACRO Bender makes perfectly centered eyes from rod or strip stock at high hourly production rates. Both eye and centering bend are formed with one operation. Any size eye may be formed within capacity of bender and ductile limits of material.

DI-ACRO Bender No. 1
Forming radius 2" approx. Capacity 3/8" round cold rolled steel bar or equivalent. Also Benders No. 2 and 3, with larger capacities.



With DI-ACRO Benders

DI-ACRO Precision Bending is accurate to .001" for duplicated parts. DI-ACRO Benders bend angle, channel, rod, tubing, wire, moulding, strip stock, etc. Machines are easily adjustable for simple, compound and reverse bends of varying radii.

Send for CATALOG
"DIE-LESS" DUPLICATING showing many kinds of "Die-less" duplicating produced with DI-ACRO Benders, Brakes and Shears.

DI-ACRO PRECISION MACHINES DIE-LESS DUPLICATING
O'NEIL-IRWIN MFG. CO. 304 EIGHTH AVENUE SOUTH • MINNEAPOLIS 15, MINN.

W. Fred Dolke, 189 West Madison street, Chicago, is engineer.

FORT ATKINSON, WIS.—Moe Bros. Mfg. Co., manufacturer of lighting equipment, has let contract to T. S. Willis, Janesville, Wis., for a plant addition.

MILWAUKEE—Rundle Mfg. Co., 3305 West Forest Home avenue, manufacturer of plumbing supplies, plans factory addition and improvements. A. A. Wickland & Co., 205 West Wacker drive, Chicago, are engineers.

MILWAUKEE—Eclipse Moulded Products Co., 5150 North Thirty-second street, has let contract to Val Schramka Building Co., for a one-story plant addition 100 x 112 feet.

MILWAUKEE—L. Burmeister Co., manufacturer of flour mill elevators, has let contract to Selzer-Ornst Co. for a one-story factory 100 x 200 feet at Mitchell and South Forty-fifth streets.

MILWAUKEE—Toolife Process Inc. has been incorporated to process tools, etc., by Lorenz W. Heise, 2631 North Ninety-sixth street.

NEKOOSA, WIS. — Nekoosa-Edwards Paper Co. plans a four-story bleaching plant and one-story filter building.

RACINE, WIS.—Harvey Spring & Forging Co., manufacturer of agricultural implements, has been bought by E. S. Gaynor and associates, of Sioux City, Iowa, who will operate it as the Harvey Mfg. Co.

RACINE, WIS.—Racine Heat Treating Co. has been incorporated with $100,000 capital to heat treat metals, by John P. Smith, Stanley Gorsiski and Henry G. Shellow.

MINNESOTA

JACKSON, MINN.—City, A. E. Wallace, city clerk, will receive bids until Feb. 15 for a 2000-kw steam turbogenerator unit. Jesse B. Harris Co., Wesley Temple building, Minneapolis, is engineer.

MINNEAPOLIS—Ideal Equipment Co., 1440 Northwestern Bank building, has been incorporated to manufacture loading machinery, by F. H. Durham, A. W. Swanson and E. M. Anderson.

MINNEAPOLIS—Northwestern Metal Products Co., tool manufacturer, 1127 First National-Soo Line building, has let contract to James Leck Co. for a one-story plant 80 x 120 feet. Long & Thorshov Inc., 1200 Second avenue South, are architects.

MINNEAPOLIS—C & S Tool Co., tool manufacturer, 695 Lowry avenue Northwest, is building a one-story factory addition 55 x 110 feet. T. S. Carter and H. J. Sadler are owners.

ST. PAUL, MINN.—Progress Pattern & Foundry Co., 1457 Marshall avenue, has let contract to Peter Kammerer for a one-story factory addition 58 x 90 feet, to replace plant recently burned with loss of $60,000.

ST. PAUL—J. M. Dalglish Co., 41 Fillmore avenue West, assembler of erection sets for Bailey bridges for Army engineers, is building a one-story plant addition and will install overhead crane and spot hoist.

WYOMING, MINN.—Tyra Mfg. Co., war contractor, plans a one-story plant addition 110 x 120 feet. Wright & MacGregor, 1108 Nicolett avenue, Minneapolis, are architects.

IOWA

OTTUMWA, IOWA—Martin Machinery Co. has been incorporated with $25,000 capital to manufacture electrical equipment and agricultural implements, by W. Leo Martin, president, and associates.

IDAHO

BOISE, IDAHO—Olson Mfg. Co., Harold Agee, general manager, has announced plans for postwar manufacture of heavy-duty machinery trailers, logging trailers and steel commercial truck bodies.

STIBNITE, IDAHO—Bradley Mining Co. plans to enlarge Yellow Pine mine to produce 1000 tons of ore daily. Smelter will be installed after the war. Harold D. Bailey, Stibnite, is resident manager.

CALIFORNIA

BURBANK, CALIF.—General Controls Co. has building permit for a factory building 80 x 300 feet, to cost about $35,000, at 1320 South Flower street.

LOS ANGELES—B., B. & F. Metal Finishing Works has been formed by Jack Harris and is established at 5916 South Compton avenue.

LOS ANGELES—Western Metal Weatherstrip Co., formed by Lawrence L. Karlson and associates, has established its business at 2923 South Hope street.

LOS ANGELES—Progressive Machine Shop has buidling permit for a machine shop addition 40 x 70 feet, to cost about $5000, at 1027 South Boyle avenue.

LOS ANGELES—Cude Steel & Smelting Corp. has been organized with $100,000 capital by John H. Baird and associates. Wilbert C. Hamilton, 639 South Spring street, is representative.

LOS ANGELES—National Armament Co. has been incorporated with $25,000 capital by Roland T. Kinney and associates, 2525 East Forty-ninth street.

LOS ANGELES—Fruehauf Trailer Co. of California, 5137 South Boyle avenue, will build a 40,000-square foot addition costing about $80,000 to increase production of heavy trucks and trailers.

LOS ANGELES—Weaver Mfg. Co., 1637 East 102nd street will build a 7000-square foot addition to increase output of dies, die castings and aircraft parts.

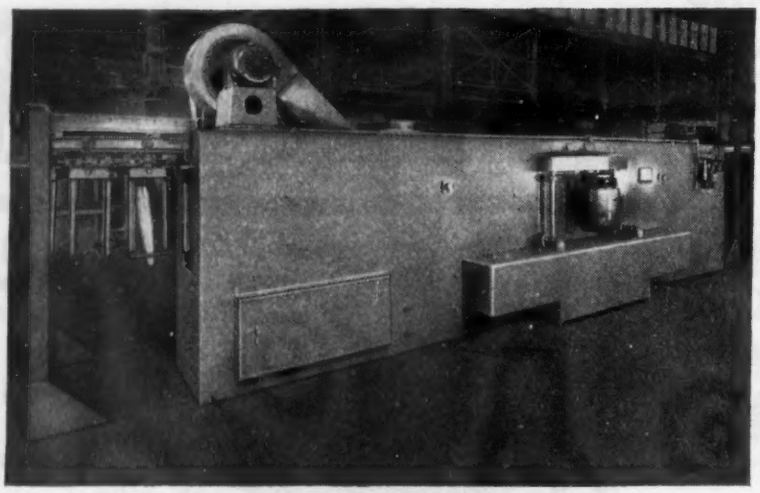
LOS ANGELES—General Motors Corp., 2700 Tweedy boulevard, South Gate, Calif., will

RANSOHOFF

to economize, modernize

Metal Cleaning EQUIPMENT

Equipment for the surface treatment of metals



FOR MISCELLANEOUS CLEANING BEFORE PAINTING

RIGHT now, machines like these are more important than ever to prepare light gauge, cold-rolled, pressed steel parts for painting. They enable you to keep production rolling along in first-class shape . . . they prove the value of modern equipment in cutting costs . . . they use least man-power . . . they

WASH. RINSE. RUSTPROOF. DRY BEFORE PAINTING

Photograph (M55) shows machine cleaning projectiles which are delivered to the machine by a conveyor, carried through in pivoted fixtures in which shells register with sprays. After leaving the machine the fixtures can be tilted to load or unload the shells.

RANSOHOFF ENGINEERS in our plant or in the field will be glad to discuss your cleaning problems.

N. Ransohoff, Inc.

1317 TOWNSHIP AVE. CINCINNATI 16, OHIO

NEW MODEL • HIGHEST ACCURACY
CHRONOMETRIC®
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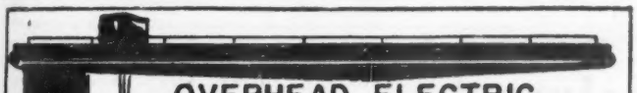

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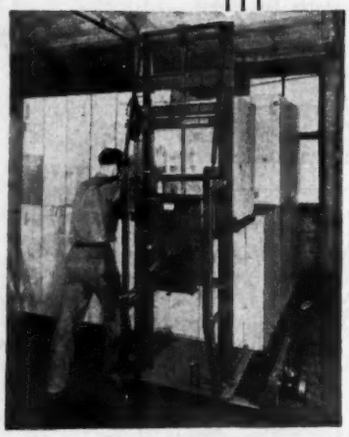

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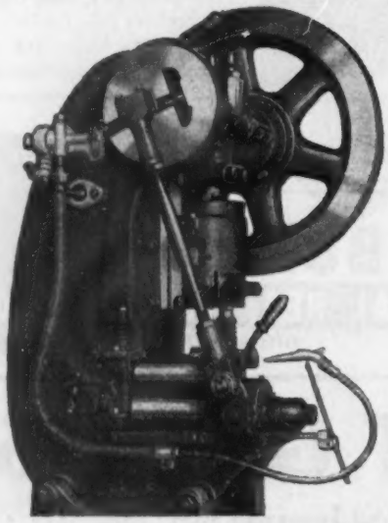

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build plant additions costing about $650,000.

LOS ANGELES—Sawyer Electrical Mfg. Co., 5701 Smithway street, is building two plant additions covering 32,000 and 57,000 square feet. Company makes electric motors, buffers and grinders.

LOS ANGELES—American Foundry, 7001 Telegraph road, will build a 4200-foot addition to its magnesium casting division.

LOS ANGELES—Fletcher Aviation Corp., 190 West Colorado street, Pasadena, Calif., is adding 2500 square feet to its production space, for production of aircraft and parts.

LOS ANGELES—Ducommun Metals & Supply Co., 4890 South Alameda street, will build a cafeteria building, on plans by A. C. Martin, 233 Higgins building.

OAKLAND, CALIF.—J. Philip Murphy Corp., 696 Pennsylvania avenue, will build a steel fabrication plant on a 15-acre site at Ninety-second street and San Leandro boulevard, including four buildings and extension of spur tracks.

SAN FRANCISCO—Kennametal Co., Latrobe, Pa., has bought a site at Santa Clara, Calif., and will build a branch plant for manufacture of carbide tool blanks and specialties. Pasetta Construction Co. will erect the first unit, to cost about $30,000.

WILMINGTON, CALIF.—Anchor Metal Products, organized by C. M. Goleman and Wendell Phillips, is conducting its business at 1600 Wilmington boulevard.

WILMINGTON, CALIF.—Union Oil Co. of California is having plans drawn by Claude Beelman, 1019 Union Bank building, Los Angeles, for a steel frame warehouse 120 x 360 feet and machine shop 120 x 380 feet, with traveling cranes, salvage building and storage racks. Cost is estimated at $1,000,000.

OREGON

PORTLAND, OREG.—Northwest Tube & Fabricators will let contract soon for a one-story plant 100 x 100 feet for manufacture of steel tubing for sprinkler irrigation, hydraulic mining, etc. Harry Yager is general manager.

DPC Authorizes Plant Expansion, Equipment

Defense Plant Corp. has authorized the following expansions and equipment purchases (figures are approximate):

Lempco Products Inc., Bedford, O., $1,700,000 to provide plant facilities at Bylesville, O.

Pittsburgh Coke & Chemical Co., Pittsburgh, $1,500,000 to provide facilities at Neville Island, Pa.

Buckeye Cotton Oil Co., Memphis, Tenn., $2,200,000 to provide plant facilities at Memphis.

Hughes Tool Co., Houston, Tex., $6,000,000 increase in contract to provide additional plant facilities at Houston, making overall commitment $17,000,000.

Goodyear Tire & Rubber Co. of Kansas Inc., Akron, O., $4,250,000 increase in contract to provide additional facilities at Topeka, Kans., making overall commitment $10,400,000.

Hearin Tank Lines, Baton Rouge, La., $100,000, to provide transportation equipment for operation in Louisiana.

Koppers Co. Inc., Pittsburgh, $450,000, to provide machinery and equipment at a plant in Chicago.

Phelps Dodge Copper Products Corp., New York, $165,000 increase in contract to provide additional equipment at a plant in Los Angeles, making overall commitment $4,200,000.

Copper Range Co., Pittsburgh, $165,000 increase in contract to provide additional equipment at a plant in Pittsburgh, making overall commitment $540,000.

Textile Machine Works, Reading, Pa., $230,000 increase in contract to provide additional equipment at a plant in Wyomissing, Pa., making overall commitment $985,000.

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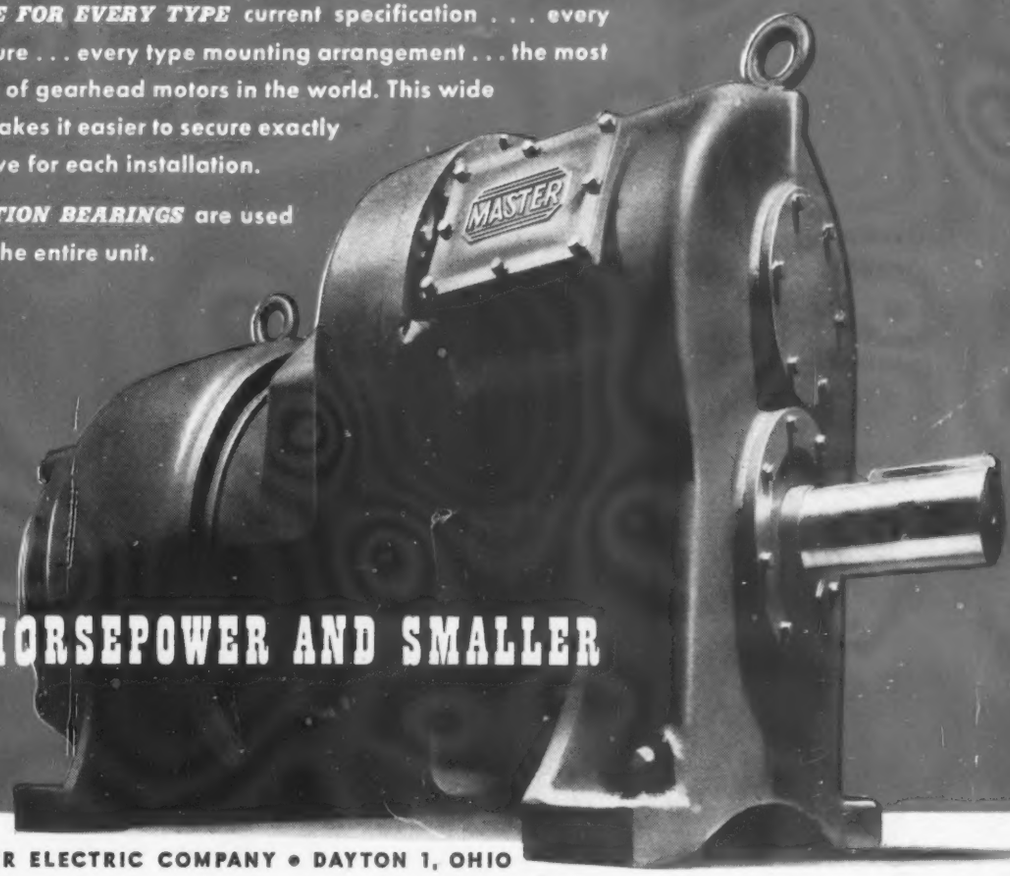

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